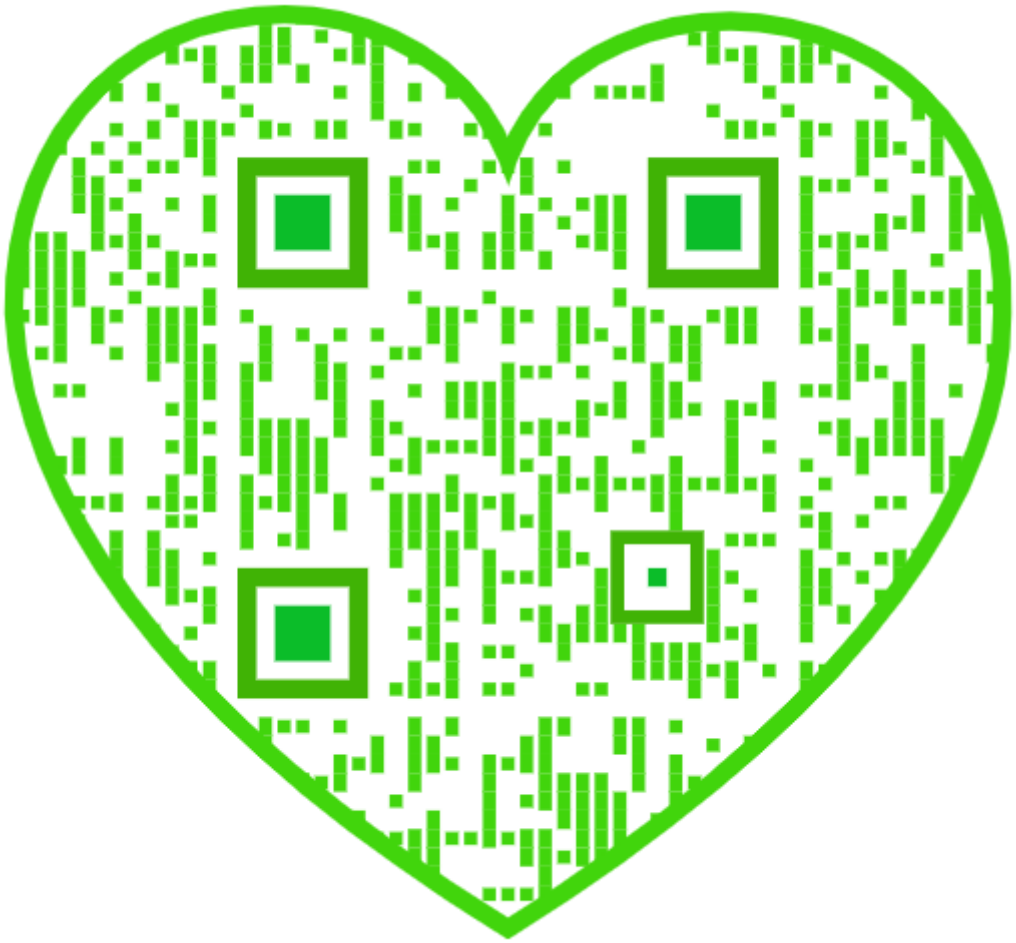

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HOME AND WORLD SERIES

HOW WE ARE FED

A GEOGRAPHICAL READER

BY

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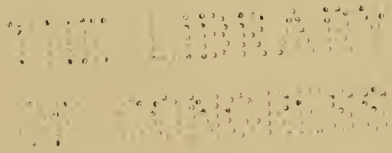
LOS ANGELES, CALIFORNIA



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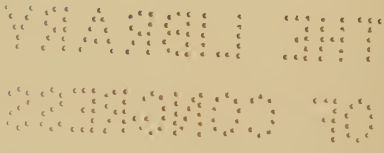

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PREFACE

In the ordinary course of events, most individuals take some part in the manifold industries which engage the mind and the hand of man, by which alone our present-day civilization can be maintained. These great world activities touch the daily life of *every* member of society, whether child or adult, worker or idler.

A chain of mutual dependence, too often unrecognized, binds together the members of the human family, whether they belong to the same community or dwell on opposite sides of the earth. The links of this chain are made up of the articles which constitute our daily food, our clothing, homes, fuel, light, our means of communication and transportation, and only by continuous coöperation are they kept together.

The highest motive in education is to present the conditions which will lead to the most complete living; to build up the best possible mem-

bers of society; to develop character. An individual who does not understand the life of which he finds himself a part, cannot be in full sympathy with its conditions and hence cannot be of the most service to himself or to others. Only to the extent that education and life follow the same general course, can each be truly successful. Far too little is done in our schools to acquaint children with their relations to the great industrial and social organization of which they are members. Even grown persons have, as a rule, a very indefinite knowledge of these relations.

It is a recognized principle that our knowledge of geography has its foundation in our knowledge of the home. The natural connecting link between the immediate surroundings and the outside world is the *present daily life of the home*. Through the industries seen in the community, the commodities in general use, and the history of their creation and supply, the pupil acquires an insight into the life about him as well as into that of other parts of the world. He also realizes the great truth that the world

and its people are in intimate touch with *him*. In this way he is led back and forth along the routes which civilization has followed in its progress, which it also follows to-day, as mankind clasp hands across oceans and continents. Thus the remote and abstract become immediate and concrete. Facts are seen in a setting of reason, and a logical and interesting basis for the study of physical, climatic, and human conditions is furnished.

This study begins with the commodities in constant use and finally encompasses the whole world, but always with the home as the base of operations. It will create a knowledge of the interdependence of individuals, communities, and nations, and a genuine respect for the work of the hands and for the worker. The importance of this respect is not likely to be overestimated. Without it a true democracy cannot long exist.

Reading should not only serve for the acquisition and the expression of the thought contained in the printed page; it should, in addition, stimulate to *new* thought — to independent power in reasoning. On this account questions are in-

serted which the pupil is left to answer. These are suggestive of a much larger number, which should be worked out by the teacher. Too many of the questions found in books do not "stimulate thought" or "independent power in reasoning." They are purely informatory and not at all formative.

No attempt has been made to treat every article of food. Those in most general use, as well as those which will best serve to develop a knowledge of geographical conditions and of man's relation to man, have been chosen.

A given industry is pursued in somewhat different ways in different places. It has not been thought wise to describe each modification in these pages. For example, the method of handling wheat in California is different from that employed in Minnesota. The value of the work will be increased if the teacher will bring out these points.

All places mentioned should be definitely located, both as to position on the map or globe and with reference to the home. When developed from the standpoint of direct, personal

interest, a knowledge of the location of places as well as of other facts mentioned is most likely to be retained.

The illustrations used have been very carefully selected for their *teaching value.* They give a clearness to mental pictures which can be derived only through observation of that which the illustrations symbolize. Much experience in the use of geographical illustrations has shown that pupils need to be directed in their examination of them. To secure the best results they must be made the centers of thought-developing questions.

Thanks are due the Pillsbury-Washburn Flour Mills Company of Minneapolis, the Swift Packing Company of Chicago, the Walter Baker Company of Dorchester, the United Fruit Company of New Orleans, and Dr. Charles U. Shepard of Pinehurst Plantation, for the excellent illustrations furnished by them.

JAMES FRANKLIN CHAMBERLAIN.

State Normal School,
Los Angeles, March, 1903.

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HOW WE ARE FED

HOW WE ARE FED

THE PAST AND THE PRESENT

Long, long ago people did not live as we do to-day. Their homes were very different from ours, for they were made of the skins of wild animals, of the limbs and bark of trees, or of tall grasses. There were no stoves, chairs, tables, or beds in their houses. Instead of lamps, gas, or electricity, a fire on the dirt floor or in front of the house, furnished the light.

The clothing of these people was as simple as their homes. It was made of skins and furs in cold countries and in warm countries of braided grasses and the fibers of certain plants. You may be sure that tailors and dressmakers were not consulted as to the latest styles, for the styles did not change and there were neither tailors nor dressmakers to talk to. Each family

made its own clothing, and there was not a sewing machine to be found.

How would you like to use a bone for a needle? Sometimes, instead of sharpened bones, long thorns were used. The sinews of the deer, or of some other animal, usually furnished the thread.

When the people were in need of food, they went into the forest and gathered roots, nuts, and fruits. Wild animals were killed by means of such weapons as bows and arrows and spears, and fish were caught in the lakes and streams.

The food was not cooked as ours is; for, as I have told you, there were no stoves. Sometimes the meat was broiled over the fire, sometimes baked in a hole filled with ashes and coals, but it was often eaten raw. It was not easy to have a variety of food, and there were times when it was very difficult to obtain anything. When food was abundant, the people feasted, and when it was scarce, they were often hungry. How would you like to wait for your breakfast while your father

went to the woods or to the river in search of something to eat?

When the meals were prepared, they were not neatly served as yours are, but each person

Fig. 1. — Indians at Dinner.

took his portion and sat on the ground while he ate it.

All of this seems very strange to you, I know. If you live in the city, you are accustomed to seeing the butcher, the baker, the milkman, and the grocer call every day. There are stores

where people can buy whatever they want to eat, drink, or wear. You wonder how any one could live in such a way as I have described, but there *are* people who live in this fashion to-day, although you have never seen any of them. They are *uncivilized*. Where do you think they are to be found? When people live in this way, it takes most of their time to provide themselves with the things that are necessary to life. They have little opportunity to improve their ways of living and of thinking.

Civilized people divide their work. Some provide food, some make clothing, some build houses, and some furnish fuel. Each one does his or her part. In this way, you see, they learn to do their work better and better, because each gives much time and thought to one kind of work. This plan gives each one time to study and to learn something about the world and its people. Think how much better our homes, our clothing, and our food are, than are those of uncivilized people, and how many other advantages we have.

It is only possible to live as we do, when

each one works for others as well as for himself. If any one fails to do his part, the rest must suffer until some one is found to take his place. It is to prepare yourself to do *your part* in some useful work for others, that you are

Fig. 2. — White People at Dinner.

going to school day by day. You do not now know just what that work is to be, but I want you to remember that *all* honest work is noble. It is not so important *what work* you do, as it is that you should do your work *well*. No matter

what your work may be, you can carry sunshine in your face and helpfulness in your heart. If you do this, you will be known and loved. Hard work, coarse clothes, and lack of money can never hide these things, neither will the finest of clothing cover a selfish or untruthful nature.

Let us look at this dinner table loaded with good things to eat and drink. There are bread, butter, meat, vegetables, milk, tea, fruits, and other things. You see at once that many persons must have worked to provide this food, for only a small part of the work was done in the kitchen. If these things could but speak, they might tell you stories as wonderful as fairy tales. They have been gathered here from the fertile plains of the West, from the sunny South, from Brazil, from the islands of the Pacific Ocean, from far-off China, and even from the waters of the sea.

THE STORY OF A LOAF OF BREAD

In the dark granary of a farmer's barn in North Dakota once lived a modest family of grains of wheat. The bright, warm days of the summer time, during which they had been placed in this dark room, soon grew shorter and cooler. The swallows, whose mud nests were in the rafters overhead, told the wheat brothers that winter was coming, and then flew away to the balmy southland.

Soon biting winds and blinding snow came sweeping over the level land. Sometimes the farmhouse was almost hidden under the drifts, and the farmer had to shovel out a path to the barn, so that he could feed the horses and cattle. By and by the days grew warmer, the snow disappeared, and the birds returned one by one. The farmer and his men got out their plows and harrows, and prepared the soil for the seeds soon to be planted.

The wheat was now shoveled into sacks and taken to the fields. Here it was placed in great machines drawn by horses, which scattered it evenly over the land and at the same time covered it with soft soil. The men whistled and sang as they worked, and blackbirds, bluebirds, and larks flew back and forth, singing and searching for bugs and worms, as well as for the shining kernels of wheat.

The wheat was not content to remain underground, but kept trying to push itself out into the world. One night there came a warm shower, and the next morning what looked like tiny, green blades of grass appeared all over the field.

All through the spring and summer the wheat kept growing, and finally there appeared at the ends of the stalks clusters of kernels, just like those which the farmer had planted. Some of these kernels had produced families of twenty or thirty. These clusters are called *heads*.

As the south wind passed over the field it brought the wheat messages from Minnesota, Iowa, Illinois, Indiana, and other states, telling

Fig. 3. — Harvesting Wheat in Southern California.

of relatives who were already turning golden in the summer sunshine. One day some of the kernels thought they heard a voice from California. Do you think they did?

The grain in some of the fields was called *winter wheat*. This was because the grain had been sown the autumn before, and had remained in the ground all winter, covered by a blanket of snow. Why was it sown in the fall? The wheat of which I am telling you was called by the farmer *spring wheat*.

Soon machines, each drawn by several horses, appeared. They cut the waving grain, and bound it up in bundles called *sheaves*. These were set up in double rows to dry, and afterward put into another machine which separated the kernels from the stalks, which were now called *straw*. This work the farmer calls *threshing*. See if you can find out how this used to be done.

After threshing, the wheat was put into sacks and taken to the nearest railroad station. Freight cars then carried it across the level prairies to the beautiful city of Minneapolis,

built beside the Falls of Saint Anthony. What river is this city on? Of what use are the falls?

There are tall buildings called *elevators* here in which the wheat was stored for a time. Before being put into the elevators it was

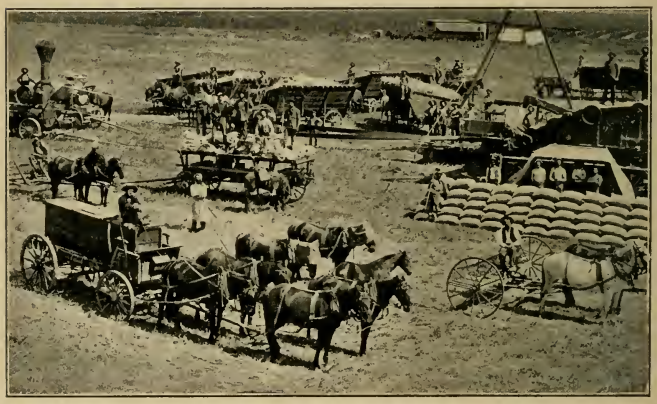


Fig. 4. — Threshing Wheat in Southern California.

examined and *graded*. As there was wheat from many farms it could not be kept separate, so each farmer was told how much he had, and how it graded.

Some time after this the wheat was taken to one of the great mills to be ground into flour. The largest of these mills manufactures

about fifteen thousand barrels of flour every day. This is the largest flour mill in the world.

When the kernels reached the mill, they were put into machines called *separators*, to be separated from all companions such as grass

Fig. 5. — The Flour Mills in Minneapolis.

seed, mustard seed, and wild buckwheat. They were then placed in an iron box in which brushes were revolving rapidly, and were *scoured* to free them from fuzz and dirt. Those that were very dirty were washed.

The kernels were *steamed*, in order that the coating, called *bran*, might not break into

small pieces. This is called *tempering*. The kernels now thought that their trials were over, but they were mistaken. Soon they found themselves being *crushed* between rollers. After they came out they were *sifted*, and then

Fig. 6. — The Largest Flour Mill in the World.

run between other rollers. This was repeated six times, and each time the flour was a little finer, for the rollers were closer together. The flour was then run through tubes of flannel. These took out whatever dust it contained. It

was then ground still finer. The flour was then put into sacks or barrels, which were marked for shipment to other parts of the country.

Only the wheat intended for the very best grade of flour is treated as carefully as this was.

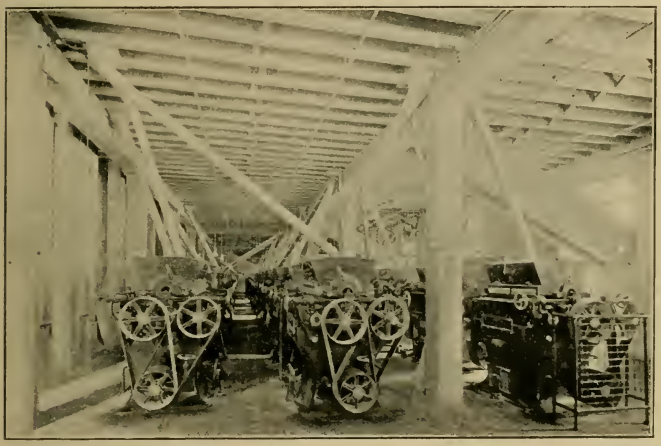


Fig. 7. — Grinding Wheat.

What industry does the use of barrels bring in?

From the mills the flour was sent to many parts of the land to supply stores, bakeries, hotels, and homes. Some of it found its way to the bakery near your home. The bakers, in their clean suits of white, weighed the flour

which they were going to use, and then added a certain amount of water to it. Some yeast and salt were added also. This mixture they called *dough*. You have seen your mother mix or *knead* dough, I am sure. The bakers did

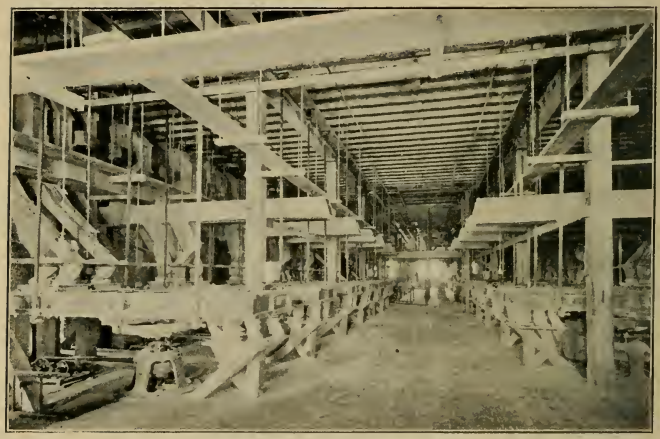


Fig. 8. — Bolting Flour.

not do the kneading with their hands, but by means of machinery made for this purpose.

When the dough had been thoroughly kneaded it was left to *rise*. It is the yeast that causes the rising. This makes the bread light and spongy. It was then cut into loaves and placed in the oven. The ovens in the

bakery are very much larger than those in your kitchen stove, for many loaves are baked at once. When a nice shade of brown appeared on the loaves, the bakers took them out of the oven by means of long shovels. Soon the delivery wagons came and were loaded with the fresh bread to be delivered to stores and homes. This loaf was just left at the door and is still warm.

So, you see, a loaf of bread has quite a history. I have told you the life story of this one from the time of its grandparents, who were raised on the plains of North Dakota. Would it not be interesting to see each of the people who have had something to do with its production, and to make the journey which the wheat and the flour made? You can do both in your thoughts.

HOW OUR MEAT IS SUPPLIED

Ramon lived in a plain, one-story house, built in the shade of some cottonwood trees that fringed each side of a small river in the eastern part of Colorado. A wide veranda extended entirely around the house, but there were very few flowers and no lawn. I am afraid you would not think it a very pleasant place for a home.

Not far from the *ranch house*, as it was called, were the barn and the *corrals*. A corral is a yard with a strong, high fence about it, in which cattle or horses may be placed. On the bottom land beside the stream, there was a corn and an alfalfa patch, besides one containing some potatoes and garden vegetables.

During most of the year the stream was quite shallow, and flowed quietly over its bed, but when heavy rains occurred it rose rapidly, spreading over much of the bottom land and

carrying so much clay with it that it was almost the color of coffee.

Except along the river, not a tree was in sight from Ramon's home, and it was many miles to the nearest house. For hundreds of miles both north and south, there stretched a vast plain. Little was to be seen but sand, grass, and sagebrush. I had almost forgotten the prairie dogs, which scamper across the plain or sit up straight and motionless on a little mound of sand beside their burrows. They watch you closely, not moving unless they regard you as a dangerous creature, when, quick as a flash, they disappear.

The rainfall is very slight in this part of the country, being less than twenty inches a year. On this account there is little attention paid to farming, but instead, the settlers own great herds of cattle as well as many horses. Ramon's father is one of the *cattlemen* of Colorado. He owns more than ten thousand head of cattle, and some of the cattlemen own twice that number. Of course such great herds of cattle must have much land to graze on. Some of

the land is owned by the government and any one may use it. Everywhere fences are far apart. These great pastures are called *ranges*.

Ramon's life is not much like yours. His home is far from schools, churches, stores, or railroads. He seldom sees strangers, but he enjoys long rides on his own pony, *Prince*. Sometimes he goes with his father and at other times he takes a gallop with one of the "cowboys" who herd the cattle.

The "cowboys" almost live in the saddle. They are out in all kinds of weather and are not boys at all, but strong, hardy men. They wear broad-brimmed hats, and carry long ropes called lassos or *lariats*, with which they catch the cattle.

Where there are so many herds they sometimes get mixed up. On this account each cattleman marks or *brands* his animals. These brands may be the initial letter of the owner's name, or they may be in the form of a horseshoe, a cross, a circle, or a crescent.

Each spring and fall the cowboys gather the cattle together. This is called "rounding

up" the cattle. They are then counted and the calves born since the last "round up" are branded. In the fall, in addition to this work, animals are selected for the market. Why is the fall a better time for this than the spring?

The cowboys, mounted upon their swift, strong ponies, single out the animals that have

Fig. 9. — Branding Cattle. — Point to the Lariats.

never been branded, and swinging their lassos over their heads, they throw them with such skill that the loop settles over the head or about the leg of the one wanted. As soon as the rope tightens, the pony braces its forefeet firmly and the animal is finally thrown to the ground.

It is then branded with a hot iron and allowed to go. Ramon used to feel very sorry for them until his father explained that it hurt them very little, for only the skin was burned.

Sometimes the cattle selected to be sold, are not quite fat enough for the market. They are then taken farther east into the *corn belt* and fed for a time.

When they are shipped directly from the range to the market, they are driven to the nearest railroad and put into yards beside the track. They are then made to walk up an incline with high railings ending at the open doors of a cattle car. The animals are arranged so that the first faces one side of the car, the second the other, and so on. This is done so that the cattle cannot hook one another, and also that they may be fed and watered on the way from a long iron trough which is fastened to each side of the car.

The great cattle markets of the United States are Omaha, Kansas City, and Chicago. Find these cities.

One day when Ramon was about fourteen

years old, his father told him that he was going to take a train load of cattle to Chicago and that he might go with him. It was a happy time for Ramon, you may be sure, for he was very anxious to see some of the wonderful sights his father had told him about.

At last the day when they were to start on their journey arrived. The afternoon before, the cowboys had driven the cattle to the railroad so as to load them early in the morning. Soon after breakfast Ramon kissed his mother and his little sister good-by, and he and his father rode off across the level plain.

Finding the cattle already loaded in the cars, Ramon and his father were soon seated in the *caboose*, rolling over the miles of railroad which connected them with Chicago. Whenever the train stopped for a few minutes, they took a long stick and went from car to car making the cattle that had lain down get up, so that they might not be injured by the others.

When bedtime came, they made their beds on the benches along each side of the caboose,

which are covered with cushions. As they had brought blankets with them, they were fairly comfortable.

Ramon did not sleep very soundly the first night. The engine shrieked from time to time, and the car rocked and jolted so that he was afraid of falling from his bed.

The next day they reached a part of the country where great cornfields waved in the

Fig. 10. — Bird's Eye View of Union Stock Yards, Chicago.

breeze. The leaves had already turned brown, and golden ears of grain peeped out from the ends of the husks. There were stubble fields, too, where wheat and oats had been harvested.

The country became more thickly settled as they went on, and the towns were nearer together. Streams were more common, and grass and timber more abundant. The young

traveler wondered why this was so. Can you tell?

Early in the morning of the fourth day the train reached Chicago. After much switching and backing the cars were run into the Union Stock Yards, and the cattle were unloaded.

Ramon was thoroughly bewildered by what he saw and heard. Men were shouting and cracking whips; others were riding up and down the alleys that separate the yards; dogs were barking and turning the animals this way and that, and gates were swinging back and forth.

The cattle were weighed and examined to see if they had any disease, and were then placed in charge of a *commission merchant* to be sold. Buyers come to the yards and bargain with these commission merchants. When an unusually large number of cattle come in, the prices are likely to fall; when few arrive, the prices rise.

When the cattle had been yarded, Ramon's father said that they would go and have breakfast. In the afternoon they visited the "yards," and the slaughter and packing houses.

The "yards" cover about a square mile of territory. They are divided into countless pens or small yards, containing sheds, feeding racks, and watering troughs.

Ramon asked how many cattle were unloaded in these yards daily. His father handed him a

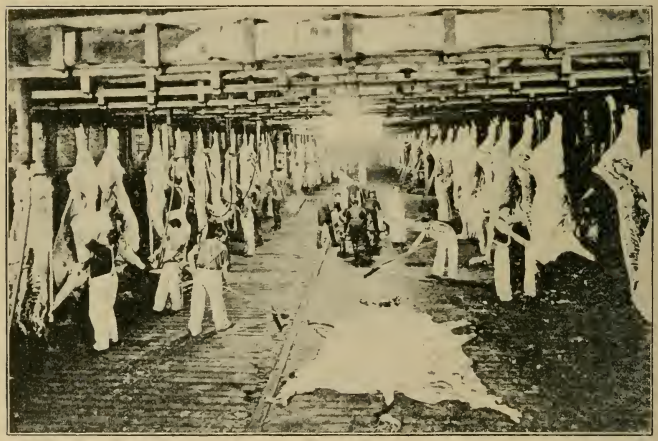


Fig. 11.—Dressing Beef.

copy of the *Chicago Live Stock World*, and at the top of the first column he read that on the day previous there had been received 18,500 cattle, 35,000 hogs, and 18,000 sheep. He was told that sometimes the receipts are much larger than this and sometimes not so large.

They followed the bodies of the cattle from the slaughterhouses where they are dressed, into the cooling rooms. These are simply great refrigerators. Wagons come to the cooling rooms and haul loads of the meat to butcher shops, hotels, and depots. Within a few hours

Fig. 12.—Cooling Beef.

it finds its way to smaller cities and towns in all directions. A great deal of meat is shipped even to Europe. Why does not Europe produce its own meat?

When the meat has thoroughly hardened in the cooling rooms, it is sent to the curing

rooms, where it is cut up and packed. Each person here does his particular work from morning until night.

Ramon learned, to his surprise, that every part of the animal is used. Hair, hide, horns,

Fig. 13. — Splitting Backbone of Hogs.

hoofs, teeth, bones, and even blood, are made use of.

Most of the hogs which enter the great meat-packing cities are raised in the corn belt.

The sheep need much pasturage, and so the largest flocks are found in the Western and

Southwestern states. A single herder may take care of several thousand sheep. His faithful companions and helpers are intelligent shepherd dogs. After a great flock of sheep has fed on an area, hardly a green thing is

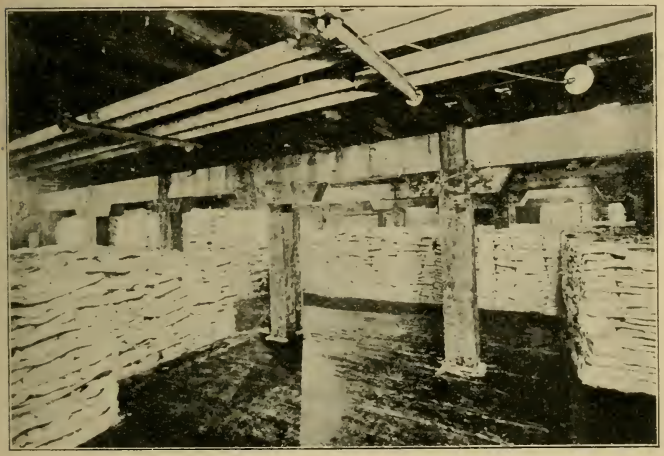


Fig. 14. — Curing Pork in Salt.

left. The people in the part of the West where there is little rainfall, object to the pasturing of sheep around the head waters of streams, because when the vegetation is removed the water runs off too quickly.

In the evening our friends watched the

men, women, and children march out of the "yards." They were told that not less than thirty-five thousand persons were employed in the various establishments. There is but one city in Colorado which contains so many people.

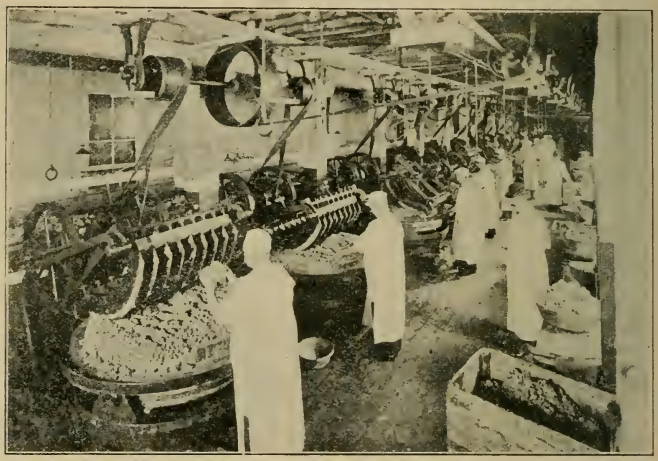


Fig. 15. — Chopping Sausage Meat.

As they sat at breakfast next morning, Ramon wondered how many of the people of Chicago were eating steaks from cattle which he had seen on his father's ranch. The thought was a new one to him. His trip had shown him that the cattlemen who lived

and worked on those far-away plains were doing their part in supplying people all over our country with meat. Their lonely life,

Fig. 16. — Packing Poultry.

with all of its disadvantages, now had a new meaning for him, and he went back to his Western home content with it, yet very glad to have had this glimpse of another side of life.

MARKET GARDENING

Think of the immense quantities of fruits and vegetables that are used daily on the tables of a great city such as New York or Chicago. As we travel up and down the streets of any great city, we see rows of buildings, sometimes built in solid blocks and sometimes a little distance apart. Some have trees and small lawns in front of them; others are without even this touch of nature. Nowhere, except in the outskirts, do we find gardens.

These people depend upon others to furnish them with their vegetable food.

Now let us make some excursions into the region surrounding one of these cities. For miles and miles we see on every hand *truck farms* or *market gardens*. The main business of those who live in these districts is to furnish food for the people of the city, so that the latter may devote their time to their various occupations.

We see growing potatoes, cabbages, tomatoes, beans, peas, squashes, turnips, onions, sweet corn, celery, melons, and many other things. Usually all of these will be found in one garden, but sometimes the farmer raises only a few kinds, or perhaps but one.

Market gardening is very common in Germany, Holland, Italy, China, and in other densely populated countries. Therefore we often find people who have come from these countries to America engaged in this business. Chinese gardeners are seldom seen in the East, but on the Pacific coast they raise most of the vegetables used in the cities and towns.

In the early spring, before the ground is warm enough to make seeds grow, the gardener starts his plants in "hotbeds." These are long wooden boxes, or frames, without bottoms, covered with glass. They are usually placed on the south side of some building or high fence. The glass covers allow the warm sunshine to enter the "beds" freely, but they prevent the rapid escape of the heat. You

see now why they are called "hotbeds." They are like small greenhouses.

A little later in the spring the fields are thoroughly cultivated and the plants transplanted. Of course only the vegetables desired for the early market are started in this way. What advantage is there in having the vegetables ready for the market very early in the season?

Vegetable farming is not easy work, although it is a pleasure to see things grow day by day as you care for them, and as nature supplies her sunshine and her rain. The fields must be cultivated almost constantly, to keep the soil loose, as well as to remove the weeds. Much of the weeding has to be done by hand, which is tedious work.

We want our vegetables fresh every morning; and as the truck farms are at some distance from the city, the farmer must load up his wagon the night before. Of course much produce is sent to the cities on trains, but where farmers live near enough to deliver it themselves, their crops are more profitable to them. Why?

Fig. 17. — A Market Scene.

Everything is put in readiness before dark; and while others are still in bed, the farmer mounts his wagon to start toward the sleeping city. I have often ridden ten or fifteen miles on such a load before the stars faded away.

It is a novel experience. At first the night seems strangely still, but soon you are able to distinguish many voices coming from various places. The frogs croak from the ponds by the roadside; crickets and locusts send their shrill notes from grass and tree; a night owl startles you by his dismal hoot; the lamps of the fireflies gleam, then disappear only to shine out again a little farther on.

At last a faint glow appears in the eastern sky, which grows brighter and brighter until the shining face of the sun is pushed above the horizon. Do you not think such a ride would be more enjoyable than a street car ride?

In the cities there are market places where produce from the country is taken. In Chicago there is a very busy street where much of the buying and selling is done. Study the picture carefully. Here the buyers from hotels, restau-

rants, and stores, as well as the men who wish to peddle the produce from house to house, go for their daily supplies. There are also commission merchants whose stores are on this street. They sell the produce for those who ship it to the city by train.

We go to the stores and get what we want each day, or the peddlers bring it to the door. You see how necessary it is to have special workers to supply us with the different kinds of food. We consider it very important that we should have vegetables and fruits fresh daily. The work of supplying us with this food is very important. Remember that those who till the soil are entitled to as great respect as are those who do not work with their hands. Contact with nature makes men and women better, and many of the noblest souls that the world has known have lived in the country and plowed, planted, and harvested the products of the soil.

Market Scene. Chicago.

Market Scene. New York.

DAIRY PRODUCTS

Uncle Ben lives on a dairy farm in the western part of New York State. It is a beautiful *rolling* country with cultivated fields, woodland, and pastures, and here and there a sparkling stream winding its way through the lowlands. The farmhouses are large and well built, and are surrounded by grand old maple, beech, and elm trees. Most of the barns are painted red with white trimmings.

There are many dairy farms in the neighborhood. Some of the farmers send their milk to the towns to be used directly, some sell it to creameries, and some to cheese factories.

Last summer I spent my vacation on Uncle Ben's farm, and Cousin Frank and I had happy times, you may be sure.

Every day, just before sundown, we went to the pasture for the cows. There were about twenty-five of them, and they always seemed

perfectly contented after the long day of feasting on rich grass and clover.

After we drove them into the barnyard Uncle Ben helped us fasten them in their *stanchions* in the barn. Then the men brought the bright pails and cans to begin milking. Cousin Frank and I always helped, although he can milk much faster than I. Some of the cows gave but two or three quarts, while others gave as many gallons.

We strained the milk into cans holding eight gallons each, and put them into tanks of water to cool. After milking was finished we turned the cattle into the barnyard for the night.

In the morning we commenced milking about sunrise. After breakfast the cans were loaded into a spring wagon and Uncle Ben drove to the depot. Here they were put on the "milk train," which took them to the city.

Many other people sent milk on this same train. It was sent to bakeries, to hotels and restaurants, and to milkmen, who delivered it from house to house. Usually the milkmen put the milk into pint or quart bottles for people

who like to have it in that form. Uncle Ben told us that much of the milk that is sent to New York City is bottled before it is sent. The bottling is done by machinery. He also told us that, because of the great importance of having pure milk, there are, in all cities, inspectors who carefully examine the milk and report to the Board of Health. The cows also are inspected, and if any are sick, they are usually killed.

Each evening some one drove to the depot again to get empty cans which the milk train had brought home. These were always carefully washed in hot water before being used again.

BUTTER MAKING

One day, after I had been on the farm about a week, Uncle Ben took Frank and me to the *creamery*. A creamery is a place where the milk and cream are separated and butter is made.

We found several wagonloads of milk being unloaded. The milk was weighed as it was received, for it is sold by weight.

The milk was then strained into a large galvanized iron tub, from which a pipe carried it into a circular machine called the *separator*. The separator revolves rapidly, throwing the milk, which is heavier than the cream, to the outer edge, where it passes through small holes into a compartment by itself. The cream rises along the center and passes through another set of openings into a special compartment. A pipe carries it to a large vat, while another pipe conveys the milk to large tanks.

Uncle Ben told me that when people make their own butter, they must wait for the cream to *rise* on the milk. The cream is then skimmed off, and the milk is called *skimmed milk*. Although the milk in the creamery is not skimmed, the same name is used for it.

I asked if the skimmed milk was used for anything. Uncle Ben gave me a cupful of it to taste. It was very good. He then told me that the separator takes out only the part needed in making butter, leaving all of the sugar. I did not know before that milk contains sugar.

The farmers take home loads of this milk to feed it to their hogs. For each hundred pounds of milk delivered, they get back seventy-five pounds of skimmed milk, besides the pay for their cream.

The creamery man told me that he made from four to six pounds of butter from one hundred pounds of milk.

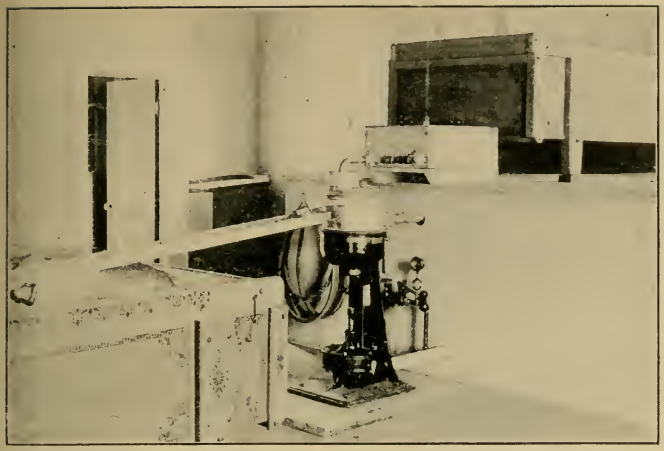
The cream remains in the large vat about twenty-four hours before it is churned. The churn, as you see by the picture, is a great

barrel made to revolve by machinery. It takes from thirty-five minutes to one hour to churn. The man told me that I might look at the book in which he kept the record of the churning. I saw that he made from two hundred fifty to six hundred pounds of butter at a churning. He said that some churns would produce more than one thousand pounds at a churning.

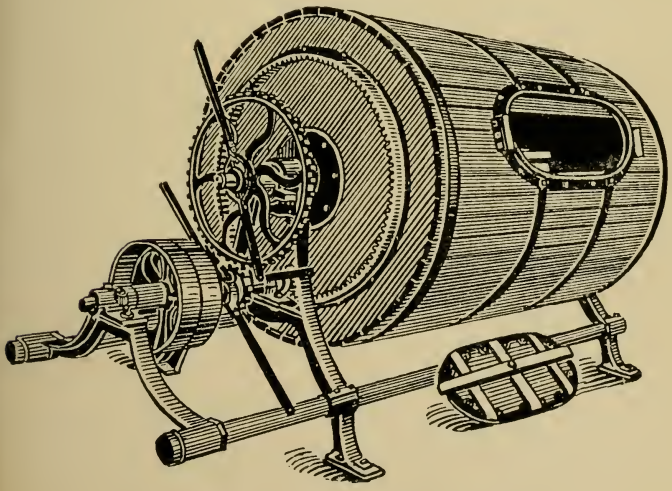
Not all of the cream is made into butter. There is left in the bottom of the churn a liquid called *buttermilk*. This is drawn off, and the butter is washed and *worked* before being taken out of the churn. The working is done by means of paddles in the churn. It continues for six or eight minutes and squeezes the liquid out of the butter.

While the butter is being worked, it is salted. Some of the butter is unsalted, but most of it is salted. When butter is made in the home, it must be churned by hand. Only a few pounds at a time can be made in this way.

When the butter was taken out of the churn, the men packed it solidly in wooden boxes about two feet square and four inches deep. The bottom



A Separator.



A Churn.

of each box consisted of strips as wide as a *square* of butter. These were held together by a clamp, and the sides were hooked to the bottom and to one another. When the butter is to be cut into squares, these sides are removed and zinc ones take their places. In these there are slits running from top to bottom. Through these slits a wire saw is run, and so the butter is quickly cut into one or two pound squares. The butter is then wrapped in fancy papers upon which the name of the butter or of the creamery is stamped.

Of course some of the butter is packed in wooden tubs and shipped in that form. This butter is a little cheaper than that put up in squares.

CHEESE

I was so much pleased with my visit to the creamery, that Uncle Ben promised to show me how cheese is made. So one morning just after breakfast he, Cousin Frank, and I started out. After a pleasant ride of about five miles we reached the factory.

The first process here was the same as that at the creamery. After the milk was weighed it was run into great zinc-lined vats. There were four of these in the factory, each of which held about five thousand pounds.

Uncle Ben explained that the milk must *curdle* before cheese can be made. In order to make it curdle quickly, a little less than a pound of a substance called *rennet* was put into each vat.

A man worked at each vat with a long wooden rake, stirring the milk constantly. I saw a glass tube standing in the milk and asked what it was. Uncle Ben told me to

look at it closely. I saw that it was a thermometer, and that it registered eighty degrees. A little while after I looked again, when it showed a temperature of ninety degrees. The milk is kept warm, so as to help it to curdle quickly.

In about an hour I could see the curd very plainly, but the men kept on stirring and cutting it. Presently one of them carried a piece of the curd to a table. He heated a small iron rod and touched it with the curd. When he pulled the curd away, little threads were drawn out to the length of half an inch or more. This he called the "acid test," which showed that the curd was in the right condition to be made into cheese.

Of course only a part of the milk had turned into curd; the rest was *whey*, that was drawn off and run into tanks. Each man who had delivered one hundred pounds of milk was given a check for seventy-five pounds of the whey. It is fed to hogs. About two hours from the time that the milk was put into the vats, the whey was drawn off.

One of the men now took a long knife and cut the curd into oblong cakes. These he frequently lifted and turned over. After continuing this for about twenty minutes, the pieces of curd were put into a small mill, placed on a board over the vat, and the curd was chopped into strips from one to six inches long and from one-half an inch to an inch thick. Salt was scattered over the mass by one man, while another pitched it about with a three-pronged wooden fork. The man told me that he used three pounds of salt to each thousand pounds of milk.

Next, a piece of cloth was placed on a board about sixteen inches square. Two circular metal frames or bands, about six inches high, were fitted one within the other and placed on the cloth. The frame was filled with curd, covered by a cloth, and another set placed on top of it until there were five. They were then put on a table directly under a block which was fastened to a screw. By turning the screw the block was pressed against the top board, and so each frame of curd was pressed. I saw the whey running out as the squeezing went on.

The superintendent told us that the curd would be left in the press until the next day.

We were then taken into the room where the cheese "ripens." Here we saw large racks reaching nearly to the ceiling, filled with double rows of cheeses. The smallest ones weighed but three pounds, while the largest weighed fifty pounds. It may take but a few days and it may take many months to "ripen" a cheese. It depends upon the flavor wanted. The man said that in England "strong" cheese is generally liked, while in our country "mild" cheese is preferred.

I asked how much cheese five thousand pounds of milk would make, and was told that it would make between four and five hundred pounds.

On the way home Uncle Ben told us that although our country is a great dairy country, we import certain kinds of cheese from Europe. He told us how the Swiss people pasture their cattle on the steep mountain sides, and that in every little mountain valley cheese is made, some of which finds its way over the mountains and across the sea to the United States.

THE FISHING INDUSTRY

Have you ever stood by the side of a stream and watched the fish dart from one shadow of overhanging rock into another, or swim lazily at the bottom of some deep pool? How gracefully they move and turn! How like water jewels they flash as the sunlight falls upon them!

Most streams and lakes, like the ocean, contain fish. So we have fresh-water and salt-water fish. There are a few bodies of water so full of salt that fish cannot live in them. Do you know of any such bodies of water?

Most of the fish used as food come from the ocean. In this, and in most other countries, there are many men who do nothing but fish, in order that other people may be supplied with this sort of food. They do not depend upon hook and line alone, but use nets also.

Nets are great sacks made of cord, knotted or woven together in such a way as to leave

spaces or *meshes*. These meshes are not big enough to allow large fish to escape. Sometimes the fishermen go out in rowboats some distance

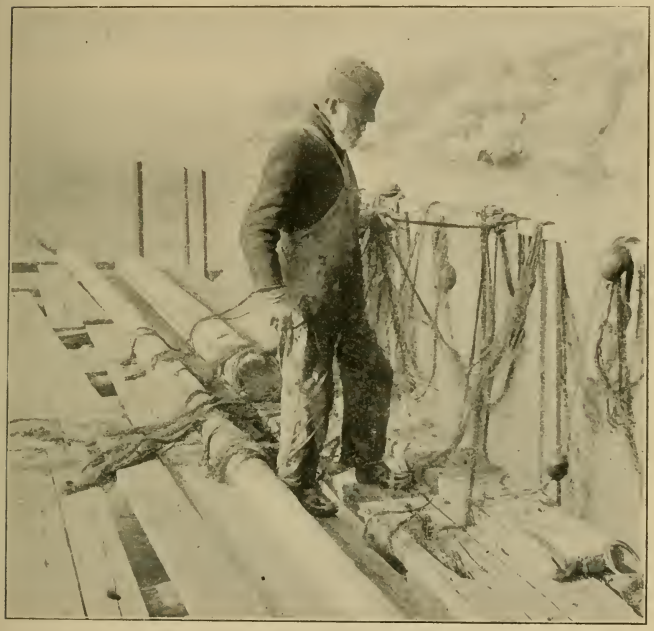


Fig. 18. — Drying Nets.

from shore and then throw the net into the water. Corks or floats keep the upper edge of the net near the surface, while weights hold the lower edge on the bottom. Ropes are fastened

to each end, and so it is drawn toward the shore. How the fishermen wish that they could see to the bottom of the restless water and know what their harvest is to be! When the boats have almost reached the shore, horses are sometimes driven into the water and hitched to the ropes. At last the net is dragged out upon the sands and the uncertainty is past.

Look! Within the folds of the net is a countless number of fishes, each jumping, squirming, wriggling, trying to get back to its ocean home. They are of many sizes, shapes, and colors. Those not good for food, together with the smallest ones, are thrown back into the water.

Sometimes a net called a "dip-net" is dropped from a fishing schooner and drawn about a "school" of fish. I have seen many barrels of fish brought up at one time in this way.

The fishermen keep a close watch for the appearance of these "schools," you may be sure. Whales and dolphins pursue them, and gulls and cormorants circle overhead, for they, too, are

fishers. Their appearance helps the men to tell where the "schools" are. There is a great rush for the fishing grounds when they are sighted. The white-sailed schooners skim over the waters almost like a flock of birds.

Fig. 19. — A Fishing Schooner.

Large quantities of fish are caught by a method called *trawl fishing*. This may be carried on miles from the shore. How do you suppose it is done? To a very long and strong line, many shorter ones, each with a hook at the end,

are attached. These lines, to which large buoys are fastened, are left in the water for several hours, and then fishermen in flat-bottomed boats called *dories* row out from the schooner and examine them. The lines are then reset and

Fig. 20. — Splitting Codfish.

the fish taken to the schooner to be dressed. This is a common method of catching codfish, which is carried on during summer and winter alike. Storms and fogs are likely to occur while the men are out in their little

boats, making their work full of danger as well as of hardship.

Many of the fish are packed in ice and sold fresh, while others are cured on the boats or on shore. Some of the fishing schooners carry great quantities of salt when they start out on a trip. The fish are dressed and packed in this. Sometimes they are packed in brine, and along the shores of some countries they are strung on poles to dry.

Codfish are dried in great quantities along the New England coast by placing them on frames made of strips of wood and raised a little above the wharf, so that the air can circulate freely. When the skin and bones are removed and the flesh cut into strips, it is called "shredded" codfish.

The principal food-fish are the cod, mackerel, herring, halibut, shad, salmon, sardines, and whitefish. Whitefish are caught in the Great Lakes. To this list the lobster may be added, although it is not a fish.

A common method of catching lobsters is to sink a box made of lath to the bottom, where

they crawl about on the rocks. A fish head is placed in the box for bait. The lobsters crawl in and are likely to remain until the box is examined.

Lobster steamers, fitted up with tanks contain-

Fig. 21. — Drying Codfish.

ing salt water, run from Nova Scotia and Newfoundland to Boston and New York. Here those not wanted are placed on cars containing similar tanks and sent to interior cities. In this way fresh lobsters are served thousands of miles from where they were caught.

A lobster that would cost us from twenty-five to seventy-five cents brings the fisherman not more than ten cents.

Along our New England coast there are many towns engaged extensively in fishing. Portland, Gloucester, Boston, and Provincetown are among the number. Gloucester is the most important fishing town in the United States. From it fishing schooners go as far as Newfoundland, Greenland, Iceland, and even to the coast of Ireland. There are also important fisheries on the Pacific coast, from San Francisco to Alaska. Here the salmon are taken in great numbers. They weigh from twenty to one hundred pounds. The fish are canned and shipped to all parts of the country. Besides being caught in nets and traps and on lines many are caught in "fish wheels." These are fastened to the stern of a boat and revolve in the water. The fish are caught in pockets and dropped in the boat as the wheel brings them up over it.

There are very extensive fisheries along the shores of the British Isles and on the western coast of Europe. Fishing is the chief industry

in the towns along the coast of Norway. The air is full of the odor of fish, while drying fish, nets, and boats are everywhere in sight.

Although the supply of fish in the ocean is very great, it is diminishing, especially near the shore. Most countries now pay considerable attention to the raising of both fresh and salt water fishes, and they have passed laws regulating fishing. Eggs are hatched in great *hatcheries*, from which the young fish are taken where they are most needed.

The great ocean is free to all to sail over or fish in at will. There is a narrow strip along the shore three miles wide, which belongs to the country which it borders. The men of other countries are not allowed to fish there.

The fisherman is a brave and sturdy man. His life is full of danger. He battles constantly with the winds and the waves. Fogs may hide the sharp rocks which seem to wait for a chance to destroy his little vessel. Sometimes icebergs or great ocean steamers sink his boat and he is never seen again.

When storms are raging and night has settled

over sea and land, and angry waves are dashing themselves into foam against the shore, the mothers, wives, and children look anxiously from their cottage windows toward the sea, and pray that their loved ones may return to them in safety.

OYSTER FARMING

It sounds strange to speak of farming in the ocean, but there are many and large oyster farms all along our coast. Some of these farms are covered by water all of the time and some are uncovered when the tide is low. Oyster farms are far more profitable than are those upon which corn and wheat are raised.

This is a new industry in our country because civilized people have not lived here very long, but it is a very old one in some parts of the world. As long ago as the seventh century a Roman knight raised oysters for the market, and it is said that the business made him very wealthy.

You will understand better about the cultivation of oysters, if I tell you first how they live and grow in their natural homes.

Except during the first few days of their

lives, oysters are prisoners. They cannot move about freely from place to place as fishes and most animals can, but they are attached to rocks, to the shells of their dead relatives, and to other objects. How, then, do you suppose they get their food? They grow in immense numbers, and they crowd one another more than people do in the tenement houses in our great cities. In fact most of them are soon crowded out, and they die, leaving room for the rest to grow upon their empty homes. In this way the oyster beds spread out.

These oyster beds are not found in very deep water, but rather along the shore, generally near the mouth of some river. As I have told you, they often live where they are uncovered when the tide goes out. You can see from this that it is not very difficult to gather oysters, so that, partly on this account, man has used them for food for ages.

When the Pilgrim Fathers landed on the shores of New England, they found that the Indians used oysters very commonly. All along the coast were great heaps of the shells. At

the very first Thanksgiving dinner given in America, oysters were served.

Oysters used to be so plentiful on these natural beds that they were very cheap. In some places where the winter weather was cold enough to freeze the water along the shore, people cut holes in the ice and gathered them by means of long-handled rakes.

In a single year an oyster will produce more than a million young ones. Just think of it! If all of this family grew up, they would fill a room fourteen feet in each dimension.

These young oysters are *very* small. They are called "spat." Most of them are drifted away by waves and currents, or devoured by larger sea animals. The few that escape soon attach themselves to some object, so getting a chance to begin the battle of life.

If oysters are caught at all times of the year it does not give them a chance to produce their young, and this, as well as catching the young ones themselves, has destroyed many of the natural beds. In order to keep up the supply of this food men commenced oyster farming.

You see how our daily needs and desires lead to the establishment of great industries.

The oyster farmer prepares his farm in various ways. He places clean oyster shells, stones, trays, bundles of sticks, and other things on the bottom, so that the oysters may find something to which to attach themselves. Then he places the young oysters or "spat" on these objects. When trays are used, several are placed one upon another and bound together by means of a chain. These trays are taken up from time to time in order to gather the oysters that are ready for market.

Stones are sometimes piled on the bottom and the "spat" are placed in the crevices between them. Often stakes are planted in a somewhat circular form. Cords are attached to the stakes, to which bundles of sticks are fastened in such a way as to keep them a little above the bottom. Young oysters attach themselves to these sticks, which may be drawn up when the proper time comes.

Shells are used more commonly than other things. They are taken from the restaurants

and hotels to the farms in boat loads, to be scattered over the bottom.

The young oysters grow at very different rates. In two years they may grow to be six inches in length, or it may take several years to reach that size. They grow more rapidly on the artificial beds, and are better in quality also. The starfish is one of the greatest enemies of the oyster, large numbers of which it destroys every year.

During the fishing season the oyster men go to the beds in their boats and scoop the oysters up from the bottom. This is called dredging. The scoops with their loads of oysters are drawn to the deck of the boat by machinery. Sometimes the oysters are gathered by means of long tongs.

As the oysters are usually in clusters, these have to be broken up. For this purpose a sort of a hammer known as a *culling iron* is used. The oysters are broken apart and sorted. Sometimes the oyster man makes three grades and sometimes four.

Oysters are not the only things drawn up in

the dredge. Starfish, lobsters, and various kinds of fishes are gathered in. The starfish are killed and the rest thrown back.

The oysters are heaped up in great piles on the deck of the boat. Sacks and barrels are filled with them, and many car loads are shipped daily from the cities near the fishing grounds. Chesapeake Bay is the center of the oyster industry in our country. Find it. There are oyster beds, however, all along both the Atlantic and the Pacific coasts.

Great quantities of oysters are canned near where they are caught. Getting them out of their shells is not an easy matter. For this purpose a knife is used. This work is called in the South "shucking oysters." Canning oysters is an important industry in the city of Baltimore. Have you ever seen cans of oysters that came from there?

A RICE FIELD

When you do not feel quite satisfied with your breakfast, dinner, or supper, and think that there should be a greater variety of food on the table, just come with me and we will visit some of the boys and girls of far-away China. What do you suppose *their* chief article of food is? Rice. Rice in the morning, rice at noon, and rice at night. Rice from the beginning to the end of the year. In the poorer families a bit of dried fish and some vegetables are usually eaten with it. Those who can afford such things have bits of preserved ginger, mushrooms, and barley cakes with the rice. Of course the rich people have other things to eat, but most of the people of China are poor.

In the fertile portions of China the people live very close together. Gardens take the place of farms. Workmen often receive no more than ten cents a day. On this account

they cannot afford the variety of food that we have, but must be content with whatever is cheap and nourishing for their labor. If the rice crop were to fail, the Chinese would suffer. You will see how important this food is to them, when I tell you that they are forbidden by law to sell rice to other countries.

Perhaps you are wondering where the rice that we use in this country comes from. Rice is grown in great quantities in Japan, Corea, Indo-China, Ceylon, India, the Philippines, the Hawaiian Islands, and in our Gulf states.

Rice is the chief food of one half the people of the world. Although we raise large quantities, we produce only about one half of what we use. It is a kind of grain which will not thrive on the fertile Western prairies where corn, oats, and wheat grow. It needs a warm climate and a great deal of water. For this reason the rice fields are found on the marshy lands near the coast, and by the banks of rivers, where they can be easily flooded. Some rice is raised on the uplands, but not so successfully as on the lowlands.

Canals are dug from the streams through the farms, and from these smaller ditches branch off so as to reach all parts. They are so arranged that the farmer can turn the water on or off whenever he wishes. On some of

Fig. 22. — A Rice Field. — Observe the Canal.

the farms, wells furnish the water to the canals.

In the Gulf states the fields are plowed in the winter, and the rice is sown between the first of April and the middle of May. Sometimes the seed is sown broadcast, as wheat is,

and sometimes it is planted in regular drills or trenches about twelve inches apart.

The Japanese sow the seed in gardens, and when the plants are eight or ten inches high, they are pulled up and transplanted to the fields. The men work right in the water, for the fields are flooded at the time.

In our country the farmer floods the field as soon as the seeds are planted, allowing the water to remain five or six days. When the young blade of rice is a few inches high, the field is again flooded. After the second leaf appears on the stalk, the water is turned on and left for twenty or thirty days. After the land dries the crop is hoed. The fields are irrigated from time to time, until about eight days before the harvest, which generally occurs in August.

When full grown, the stalks are from one to six feet in height, with long, slender leaves. The kernels grow much as those of wheat and oats do.

On account of the fields being so wet, rice, in most countries, is cut by hand. In China and Japan small curved sickles are used, and

the grain is bound up in very small bundles. In Louisiana and some other parts of the South, regular harvesters are used. They have very broad wheels. Why?

After the grain has been bound into bundles, these are set up in double rows to dry. This is called *shocking* the rice. The grain is then

Fig. 23.—Harvesting Rice.

put through a thrashing machine, to separate it from the straw.

Rice kernels are covered by a husk. Before the husk is removed the grain is often called *paddy rice.* Removing the hulls or husks is called *hulling.* The hulling machine is a long tube into one end of which the rice is poured. Within the tube are ribs which revolve rapidly.

As the kernels pass between these the hulls are taken off.

If you were passing through a Chinese village, you might hear sounds like those produced when a man pounds with a mallet on a great piece of timber. On searching for the sounds, you would find that they came from the rice mill. The mill consists of a portion of a log hollowed out and placed upright. In the hollow a quantity of rice is held. A piece of timber, fastened to a pivot, extends in a horizontal position with one end over the mill. To this end another timber is fastened in an upright position. A Chinaman gets on to the end of the long timber which is farthest from the mill. This raises the end with the upright. He then jumps off and the upright falls, striking upon the rice. In this way the hulls are worn off.

After hulling, the grain is carefully screened, in order to remove the hulls, the broken and very small kernels, and the *rice flour*. This latter makes good cattle food.

Perhaps you have noticed that rice kernels have a bluish appearance. This is not natural,

but is the result of polishing. The polishing removes much of the best part of the grain, but the rice sells for a higher price simply on account of its appearance.

The polishing machine is cylindrical or drum-like in shape. Moosehide or sheepskin is tacked to the cylinder. It is made to revolve rapidly, so that the kernels are polished as they pass over the skin. After being polished the kernels are run through screens and sorted. The rice is then put up in barrels or sacks and shipped.

HOW SUGAR IS MADE

This picture represents one of the beginnings of the great industry of sugar making. The small objects which you see in the trenches are pieces of sugar cane. These "cuttings," as

Fig. 24.—Sowing Sugar Seed.

they are called, are covered with soil. They soon sprout, and from them grow the tall, waving fields of cane, which resemble cornfields. The canes are taller than cornstalks, however.

How high do you think those shown in the picture are?

In about ten months after planting the cane is ready to cut. In the Southern states this work usually begins about the middle of October.

The canes are jointed, as cornstalks are, and

Fig. 25. — Cutting Sugar Cane.

the spongy substance between the joints is filled with a sweet juice. It is from this juice or sap that cane sugar is made. I have seen children chew pieces of the cane, and enjoy it as you do candy; for this use it is sometimes sold in stores in the South.

Fig. 26. — Loading Cars with Sugar Cane.

After the canes are cut they are hauled to the mill or sugarhouse on wagons. On the large plantations *tram cars* sometimes run right into the fields.

At the mill the canes are run between heavy rollers, which squeeze out the sap. Sometimes as many as seventy-five pounds of sap are obtained from one hundred pounds of cane. The crushed stalks are used in the mill for fuel, and the ashes are returned to the land to fertilize it.

When the juice is first pressed out, it is not at all clear in color. It is then placed in great vats or kettles and heated. This heating causes the water which is in the sap to evaporate, and it also brings some of the impurities to the top, where they are skimmed off. When the evaporating has been finished, there are two products, molasses and brown sugar.

The sugar must next be refined. For this purpose it is usually sent to cities outside of the sugar belt. There are great refineries in New Orleans, San Francisco, St. Louis, Chicago, and other cities.

When the *raw sugar*, as it is called, reaches

the refinery, which is generally a tall building, it is taken to the top story and dissolved in hot water. It then passes through bags which act as *filters*, and through a great cylinder which contains burned bones, known as *bone-black*.

Fig. 27. — A Sugar Mill.

You remember that I told you that the bones of the cattle were saved. This is one of the uses to which they are put. When the liquid comes out of this bone filter it is a perfectly clear sirup, which is then crystallized.

You know that we buy refined sugar in three forms: granulated sugar, loaf sugar, and pulverized sugar. When granulated sugar is wanted, the crystals are placed in a great drum, which revolves until they are thoroughly dried in the right form. To make loaf sugar, the crystals are pressed into molds, then dried, and cut into the size desired. In powdered sugar they are simply ground to a powdered condition.

Think how much labor is required to produce sugar, and yet you can buy it for five cents a pound.

There are great fields of sugar cane in the Gulf states, in Cuba, in the Hawaiian Islands, in the East Indies, in India, and in other warm, moist parts of the world. We buy a great deal of sugar from Cuba, and from the Hawaiian Islands. To what city do you think the sugar from the Hawaiian Islands is sent?

BEET SUGAR

Although the cane fields of the moist, hot countries yield great quantities of sugar, there are other sources from which this useful product comes. In the year 1747 a German scientist discovered that sugar can be made from beets, and now about two thirds of our supply come from these plants.

The sugar beet is not just like the plant of the same name which we raise for table use. It is white, and sometimes weighs as much as ten or fifteen pounds. Beets do not need so much water nor so much heat as sugar cane, so they can be raised in Germany, France, Austria, Russia, and other countries, as well as in California, Utah, and Nebraska, in our own land.

In some parts of California there are fields of beets stretching for miles. The seeds are planted in rows, which, after the plants have

come up, are thinned. In four or five months from the time the seeds are planted, the beets are ready to harvest.

On most of the large *ranches* the beets are dug by machinery. Men then move back and forth in the fields, cutting off the leaves and a little of the upper part of the beet, for this contains too much mineral matter to be of value in making sugar. The workmen use large knives, and they walk on their knees.

The beets are now taken to the factory in wagons, or, if it is far away, they are sent on trains. When the loads of beets reach the factory, they are weighed. The teamsters then drive up an inclined plane to a plank roadway. There are generally several of these. On each side of the road or platform are deep V-shaped trenches with wooden sides, in which streams of water run. When the wagon has reached the right spot, the platform upon which it rests is raised in a slanting position, and the beets fall into the trench.

A basket full of beets is taken from each load and tested, to see how much sugar they

contain, for this determines the price to be paid.

The stream of water in the trench carries the beets along, just as they would be carried in a brook. This, you see, is a quick and easy way of washing them.

The streams of water carry the beets into the factory, where they are cut up into strips by machinery. The juice is then washed out in vats containing warm water, and is boiled down in great tanks. The raw sugar is refined much as the cane sugar is. After the sugar has been dried, it is run through spouts into sacks held open to catch it as it comes out. One hundred pounds are put into each sack. One workman sews the sacks up and another wheels them to the wareroom. Train loads are carried away to be distributed in the parts of our country that do not produce sugar.

MAPLE SUGAR

You would enjoy helping to make some maple sugar, I am sure, so let us make a trip to the woods of Vermont or New York, where maple sugar is made from the sap of the sugar-maple tree.

Fig. 28. — Tapping a Tree.

You will need your cap and mittens, as the sugar season is the early spring, when there is yet snow on the ground. Besides, some of the work is done at night, and you will not wish to miss that.

The owner of the "sugar bush" bores holes into the trees a short distance from the ground, into which he slips small spouts, called "spiles."

This is called *tapping* the trees. Underneath

the spout a pail is placed. During the day the sap trickles out and runs into the pail. During the colder hours of the night the sap flows slowly, if at all. Sometimes it is so cold that little sap runs for two or three days at a time.

The sap is collected in barrels and drawn on

Fig. 29.— Oxen hauling Sap.

sleds to the camp or place where it is to be boiled down. This is done in great pans called *evaporators*, which may be five or six feet wide, and fifteen feet long. They are divided into sections, and these are connected by means of little openings.

The sap flows into one end of the evaporator and follows a zigzag path through the different sections. By flowing slowly over so large a surface, evaporation goes on rapidly and the sap is changed to sirup by the time it has finished its journey.

The sirup is put up in cans, or boiled down

Fig. 30. — Sap-yoke and Pails for gathering Sap.

into sugar, which is molded into small cakes, and brings a high price.

"Sugaring off," as the boiling down of the sap is called, is quite an event. Often a number of people will be invited to go to the sugar-house and take part in the operation.

Before the modern evaporator came into use "sugaring off" always occurred at night. This was necessary, because during the day the sap buckets had to be attended to. The young people would sing songs, tell stories, and eat sugar.

Some of the "sugar bushes" contain but a few trees and some contain one or two thousand or even more. A tree will yield from one to six pounds of sugar during a season.

Our country produces great quantities of sugar every year, but we use so much that we have to buy much more than we manufacture at home. It was not always in such common use, however, because people in olden times did not understand how to make it cheaply.

Long, long ago sugar was used only as a medicine. Don't you wish that all medicine to-day was as good as sugar? About seven hundred years ago an Italian nobleman died and left to his relatives, among other things, *six pounds of sugar*. His will caused considerable comment among the people, who said that no one family should be allowed to have so much sugar in its possession.

WHERE SALT COMES FROM

The Arab, journeying over the yellow sands, riding upon the back of his faithful "ship of the desert," often looks longingly for some sign of water to cool his parched lips. The sailor may ride upon the beautiful blue waters of the ocean in his white-winged ship; but although there is nothing but water to greet his eyes, he cannot drink it, for it is bitter to the taste.

If you were to place a quantity of ocean water over a fire and evaporate it, there would remain a white substance. This is common salt. You see that it is as necessary to provide fresh water when one wishes to cross the ocean, as it is if one is going to cross the desert.

Most streams and lakes contain *fresh* water, so you will wonder why the waters of the ocean are briny. The rocks and soil of the

earth contain salt, and the streams wash it from the land. Each one carries so little that we do not notice it, but they have worked so steadily and so long, that they have carried a great amount to the sea. None of it can escape, so the ocean gets more and more briny.

No healthy person would ever think of eating salt alone as a food, and yet our food would taste very unsatisfactory without it. Farmers supply their cattle and horses with salt, and wild animals search for it in the forests, and lick it from the soil with their tongues.

Salt is so important to us that I want to tell you about some of the ways in which men obtain it.

Sometimes sea water is placed in great vats and evaporated. This leaves the salt, which is then refined. You know that the sun's heat causes the waters of a shallow pond to evaporate during warm weather. Shallow basins are often scooped out along the coast, and the waters which fill them are then shut off from the larger body. In time the water evapo-

rates, and the salt, which has formed in thin layers, is collected.

I said that most lakes are fresh-water bodies. There are some, however, that are *very* salty. Great Salt Lake is one of these. Streams flow into it, but none flows out. If you were to bathe in the waters of this lake, you would find that your body would not sink.

I have seen great piles of glistening salt along the shore of Great Salt Lake which had been obtained by evaporation. A railroad runs beside the lake, and the salt is loaded upon the cars to be hauled away. When the people first settled in Utah, they used to drive to the lake in wagons to get a supply of salt.

Although the ocean and a few lakes contain immense quantities of this useful article, we get most of our supply from other sources.

In the western part of New York State, at some distance below the surface of the earth, there is a thick layer of salt. Wells are drilled down to this; water is pumped into them, and then pumped out again as brine. This brine

is evaporated in large pans made of iron, two quarts of brine yielding about a pound of salt.

In China salt has been obtained in this way for hundreds and even thousands of years. Though they had little machinery to work with in those days, yet by patient, steady effort, they drilled wells two thousand and even three thousand feet in depth. From twenty-five to forty years were required to drill some of these wells. Those who commenced them knew that they were not likely to enjoy the fruits of their labor and that others must get the benefit of what they did. What does this show about these people? What benefits are you receiving from what others have done?

Salt is also mined as coal and iron are. This is called *rock salt.* It is obtained in Germany, Poland, Austria, India, the United States, and in many other countries.

One of the most interesting salt fields of the world is in the southeastern part of California. It is on the Colorado Desert, near the Colorado River. This was once a part of the ocean floor and the rocks contain much salt.

Fig. 31. — Harvesting Salt, Salton, California. Is there any Water in this Field ?

Water seeping through the earth dissolves the salt and brings it to the surface at this place. What happens to the water?

This salt field covers an area of about one thousand acres, to a depth of from one to eight

Fig. 32. — Loading Cars with Salt. Salton, California.

inches. You can see by the picture that it looks more like a field of snow and ice than one of salt. The bright sunlight is reflected from its surface with such power that it hurts one's eyes.

A great plow drawn by a steam engine

moves over this dazzling field, and throws the salt up in furrows. It is then piled up, loaded on to cars, and taken to sheds, where it is purified. Indians and Japanese do most of the work.

In order to purify the brines they are boiled in iron pans and treated in various ways to make them fit for table use. When evaporation is rapid, the salt crystals are quite small, but slower evaporation produces larger ones. Rock salt is dissolved in water and then evaporated. To get the finest of salt, the crystals must be ground. When salt is to be used for other purposes than to season food, not so much pains are taken. Name other uses of salt.

In olden times, when salt was not so easily obtained as it is to-day, it was regarded in some countries as a luxury. This seems strange, does it not? At one time the Chinese made it into little cakes, stamped the image of the emperor upon it, and used it as money. In Arabia those who together ate food which had been salted, believed that this established a special bond of friendship between them. This led to the old saying, "There is salt between us."

MACARONI AND VERMICELLI

Have you ever wondered as you have looked at the hollow sticks of macaroni in the stores or as you have eaten them at the table, how they were made in that way, and what they were made of?

In Italy macaroni is a very important article of food, and its use is rapidly increasing in our own country. For a long time it was not made outside of Italy, where the city of Genoa was the center of the industry. Locate this city. Do you know what great man was born there? Now macaroni and vermicelli are made in other countries. There are a few factories in the United States, but most of what we use still comes from Italy.

In making these foods only the best hard wheat is used.

After grinding the wheat, the bran is taken out and the flour is placed in a large wooden

L. of C.

tub. Water is added, and the two are mixed by hand for a few minutes. In this tub a marble wheel about five feet in diameter and eighteen inches in thickness is fastened in an upright position. This wheel weighs about a ton.

After the flour and water have been mixed, the wheel is set in motion by machinery, and it slowly circles around in the tub, pressing the dough under it.

A man keeps walking in front of the wheel, moving the dough from the edges of the tub and placing it directly in the path of it. This work of pressing the flour into a paste continues for a little more than half an hour.

The wheel is then stopped and the paste, which is quite stiff, is cut into cakes about a foot square and from one to three inches in thickness.

These are put into an iron cylinder heated by steam. In the bottom of the cylinder is a copper plate filled with holes having the centers filled. A cover fitted to a great screw which turns by machinery is placed on top. This slowly, but steadily, presses the paste downward.

It is thus forced through these openings, and of course comes out in the form of round, hollow pipes.

As these pipes issue from the cylinder, they are straightened out on a wooden tray or platform, and with a large, sharp knife cut into

Fig. 33. — Drying Macaroni in Italy.

lengths of about three feet. They are then taken to a drying room and spread on wire frames covered with oiled paper. Here they are left for about five days, after which they are placed in boxes and are ready to ship.

The only difference between macaroni and

vermicelli is that the pipes of vermicelli are very small and are not hollow.

When vermicelli is wanted, two plates are placed on the bottom of the press. The under one is of iron and contains holes about one inch in diameter. The upper one is of copper and contains *groups* of very small openings. There are sometimes eighty of these openings in a group. When the plates are screwed together, the groups of small holes are directly above the larger openings.

As the paste is pressed, it passes through the little holes and then issues from the larger ones; this keeps each little group of pipes somewhat apart from the others.

Saffron is added to the paste to color it, and the great golden mass is quite a pretty sight as it steadily lengthens.

The workman cuts off six or seven feet of it at a time; and holding it above his head with one hand, he shakes it out with the other, as one might shake the folds of a piece of silk. The pipes tangle up very little. They are cut into lengths of about eighteen inches.

It is then taken to the drying room and spread out on the trays just as the macaroni is. A handful of the vermicelli is taken at a time, and by a peculiar twist of the arm it is placed on the paper in a form something like that of the letter *n*. After drying for five days it is packed and shipped.

ON A COFFEE PLANTATION

Juan and Lupe live in a beautiful valley where palm and banana trees wave their broad leaves in the breeze. It is never cold there, so that many kinds of plants and flowers grow out of doors which we do not see in our country except in greenhouses. On clear days they can see lofty mountains far to the westward, which sometimes wear caps of white.

Juan is fourteen years old and Lupe is twelve. Their skin is much darker than yours, and they have bright black eyes and black hair. Their father owns a great coffee plantation in Brazil, not far from the city of Rio Janeiro.

There are many men, women, and children employed on the plantation, and Juan and Lupe enjoy roaming about from place to place and watching them at their work.

In the nursery they see men planting the coffee seeds in the rich soil. There are some

plants that have just come up, and some that are ready to transplant. They are set out in rows, six or eight feet apart each way, and sometimes more.

The trees would grow much taller than those

Fig. 34. — A Coffee Nursery.

you see in the picture, if they were not kept pruned. Do you know why they are prevented from growing tall? Whenever you look at a coffee plantation, you see the dark green foliage of the tree, which is an evergreen. Lupe is

very fond of the blossoms. They are clear white and very fragrant.

A tree will yield a small amount the second year after planting, but it will not produce a

Fig. 35. — Picking Coffee.

full crop for five or more years. Two pounds is a good average crop for a tree.

The children like to watch the pickers as they go from tree to tree. Many of them are about their own age. Some carry a sack slung over the shoulders, and others carry baskets or pails. The *berries* must be picked by hand, for

they do not all ripen at once. They are dark scarlet in color and look a little like cranberries. A good picker gathers about three bushels in a day. The pickers are given a check every time they fill a basket. Sometimes Juan tends to this work, and he enjoys it very much. At the

Fig. 36. — Coffee Berries.

end of each week the pickers are paid according to the number of checks they have.

Within the berry are two kernels or seeds, with their flat sides together. These are called "coffee beans." It is these beans from which the drink is made.

The picking is but a small part of the work

of preparing coffee for the market. The first operation is removing the pulp. This used to be done by tramping on the berries, but now it is done in a better way.

The berries are thrown into a large tank filled with water, which carries them through a pipe to the pulping machine. This machine removes the pulp and separates the beans.

Next the beans are carried to a second tank, where they remain for about twenty-four hours, to wash off a sticky substance which covers the shell of the bean.

If you have ever put beans or peas into a basin of water, you have noticed that nearly all of them sink, while a few float. These latter are the poor ones. This is the way in which the good and bad coffee beans are separated. A pipe carries off the seeds that float on the surface of the water.

The beans are dried on cement floors upon which they are spread. This drying takes a long time. Before sunset each day the coffee must be carried under shelter, for the dew injures it. While they are drying, the workmen

stir them. Sometimes artificial heat is used, but this is expensive. Juan's father has a watchman whose duty it is to guard the coffee at night, for it is very valuable.

Each bean is covered by a strong shell, or hull, which has to be removed. The soaking has loosened this, and so it comes off easier than it otherwise would. Juan and Lupe often watch the wheels of the huller as they turn, moved by patient oxen.

There are two wheels set upright over a circular box, into which the coffee is put. As it passes between the wheels and the bottom of the box, the hulls are removed. Underneath the hull is a thin skin, which is also taken off.

In some countries people want the coffee dyed or colored. A bluish color is given to it by coating the wheels of the hulling machine with lead.

The hulls are separated from the beans in a winnowing machine, and the coffee is then sorted. Often this is done by hand. The beans are spread out on a table, and girls and

boys, and sometimes grown persons, sort it into several grades.

Juan's father has this work done by machinery. The coffee is put into a cylinder, in the

Fig. 37. — Sorting and sacking Coffee.

bottom of which there are holes of different sizes by which it is graded.

The last process is to sack the coffee and send it by railroad to Rio Janeiro. Of course it is neither roasted nor ground until it reaches its destination.

We do not produce coffee in our country, but we are the greatest coffee drinkers in the world. A large part of our supply comes from Brazil. Trace the course of the ship from Rio Janeiro to New York. Juan has often done this, and his father has promised to take him with him sometime, when he goes with a cargo of coffee.

You naturally think that coffee of different names must come from different countries, or at least from different trees. This is not always the case. Several brands may come from the same tree. The name depends partly upon the size and the general appearance of the beans.

Coffee is a native of the far East, but it has gradually been transplanted to other countries, until it is now very extensively used. Brazil, Central America, Mexico, the West Indies, the Hawaiian Islands, Java, Ceylon, and Arabia are coffee-raising countries.

In 1551 coffee found its way to the city of Constantinople; in 1652 it had reached London; and in 1720 it was planted in the West Indies.

You see it worked its way westward rather slowly.

Several hundred years ago, coffee was very expensive, so that only the rich could afford to use it. Instead of drinking it at home, people went to "coffeehouses," where it was served. To these "coffeehouses" men brought whatever news they had heard and told it to one another. In this way these places served about the same purpose that newspapers do now.

THE TEA GARDENS OF CHINA

At the bottom of the teapot you will find some leaves. Spread one of them out carefully. You can see that it was once long and slender, a little like willow leaves. It may have grown in some garden in far-away China, for we get a great deal of tea from that country.

I have told you how close together the people live on the fertile plains of eastern China. There is so little room that many live on boats on the rivers and in the harbors. On this account their farms are not so large as ours.

The tea trees in the gardens are about five or six feet high. If they were allowed to, they would reach a height of twenty-five feet; but they are kept trimmed for the same reasons that the coffee trees are pruned.

The trees are raised from seeds, and are generally planted on land which slopes toward the south. What advantage is this?

In about three years after planting, the first crop of leaves can be gathered. In China they are usually gathered four times each year, and the trees continue to yield for twenty-five or thirty years.

When the leaves are picked, they are full of sap or juice, and so have to be dried. The drying is usually done on trays made of bamboo. While they are drying, they are rubbed and rolled between the palms of the hands, so that they may dry more quickly and evenly.

Next the leaves are placed, a few at a time, in iron pans over a charcoal fire. They are left in these but a short time, for they are hot. This process is called "firing." Sometimes the leaves are "fired" but once, and sometimes twice.

The tea is then spread out, and broken bits of stems are removed. Some of the tea growers place the tea in baskets which are suspended over slow fires, for drying.

If you were to look into some of the *tea-hongs* or houses where tea is cured and packed, you would find the tea dried in a very curious fash-

Fig. 38. — Picking Tea. "Pinehurst," South Carolina.

ion. In one of the rooms you would see several Chinamen rolling and tossing balls about with their bare feet. The balls are about the size of footballs and are partly filled with tea. Although it looks like play, it is hard work. As the balls are tossed about, the tea leaves are given their rounded or twisted appearance. From time to time the workers stop and tie the bags up more closely at the neck. This method is used in making *gunpowder tea.*

Black and green teas are not different varieties, but are produced by different methods of handling.

In the great tea-hongs there are professional *tasters,* — that is, men who do nothing but sip tea from small cups, so as to grade it and fix its value. This is considered a very particular line of work and requires an educated taste.

The ocean atmosphere has a bad effect on tea, so that the very finest grades are seldom sent across the sea. When tea is to be shipped by water, it is placed in boxes lined with a sort of sheet lead. This protects the tea greatly.

Most of the tea sent to the United States lands at San Francisco. Why? How does it get to other parts of our country?

Great quantities of tea are pressed into the form of bricks and sent over mountains and across deserts into Russia.

This is called "brick tea." The Russians are great tea drinkers, and whenever any one calls in Russia, tea is served. They call their teapot a *samovar*.

Better tea is obtained from Ceylon and India than from China. In these countries Europeans have charge of most of the tea farms, and they have carefully studied the cultivation and handling of tea.

There is a little tea raised in our own country in the state of South Carolina. It is very fine in quality and people are willing to pay a high price for it. Some of it has been sold for five dollars a pound.

When tea was first brought into Europe, it was regarded as a great luxury, just as coffee was. People paid as much as fifty dollars a pound for it. It is said that some of the tea raised to-day

for the royal family of China, is worth a hundred dollars a pound.

Many people in this country do not enjoy a cup of tea unless they have milk and sugar in it. The Chinese do not use either in their tea. In Russia it is quite common to draw the tea through a lump of sugar held between the teeth.

You know that tea parties are very common. The most celebrated tea party ever held was called the "Boston Tea Party." See what you can find out about it.

A CUP OF COCOA

On the eighteenth day of June, in the year 1771, this notice appeared in the *Essex Gazette* of Massachusetts: —

"AMOS TRASK,

At his House a little below the Bell-Tavern in

DANVERS,

Makes and sells Chocolate,
which he will warrant to be good, and takes Cocoa to grind. Those who may please to favor him with their Custom may depend upon being well served, and at a very cheap Rate."

This seems to have been the first notice of the manufacture and sale of cocoa and chocolate in our country. What is peculiar about the notice?

In those days the raw product was brought to Massachusetts by the Gloucester fishermen. They obtained it in the West Indies in ex-

change for fish and other things which they took there.

When the Spanish soldier, Cortez, conquered Mexico in 1519, he found that the people of that country were very fond of a drink which they called "chocolatl." It was served to their ruler, Montezuma, in a cup of gold. When the Spaniards went home, they of course introduced the drink into their own country. For a long time it was very expensive and was not commonly used outside of Spain, for the Spaniards kept the secret of its preparation.

Cocoa and chocolate are products of the seeds of a tree called the cacao tree. It is a tropical tree and grows in both the Old and the New World.

Although the cacao tree grows wild, it is also cultivated in orchards much like fruit orchards which you have seen. The trees are seldom more than twenty feet high, but they are rather inclined to spread out. They require some shade, and so other trees are often planted between the rows to shade them. The trees begin to bear when five or six years old, and

continue to yield for forty years. There are generally two chief harvests each year, but the fruit is ripening all of the time.

The blossoms, which grow in clusters, are small and pink or yellow in color. They grow

Fig. 39. — Cocoa Pods and Leaves.

(Permission of Walter Baker & Co., Ltd.)

directly from the branches or the trunk of the tree.

In about four months after the tree has blossomed, you will find dark yellow or brown pods hanging from it. These look a little like

ripe cucumbers, but they are more pointed at one end and are grooved or fluted. These pods are from six inches to a foot or more in length, with a rather thick, tough rind.

How do you think the pods are gathered?

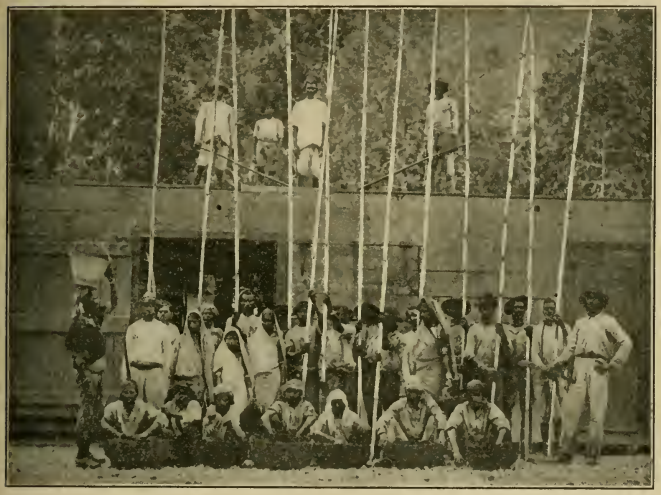


Fig. 40. — Native Cocoa Pickers. Ceylon.

(Permission of Walter Baker & Co., Ltd.)

They are cut off by men carrying long poles, sometimes of bamboo, to the ends of which knives are fastened. Only the ripe pods are cut off and collected in a heap under the tree. They are left in these heaps for about twenty-

four hours, when they are cut open and the seeds are gathered in baskets.

The seeds are called "beans." There are five rows of them, about the size of almonds, within the pink pulp of the fruit. When fresh they are white, but when dried they are brown. If you taste one, you will find it bitter.

You have often seen on packages of chocolate, as well as on the cans of breakfast cocoa, the picture of a young woman carrying some chocolate upon a tray. It is the picture of a beautiful girl who once served chocolate in the old city of Vienna. Her name was Anette Baldauff, and she married a rich count and "lived happily ever after." It is said that a painting of her hangs upon the walls of the great art gallery in Dresden. Point out the cities I have mentioned.

The seeds are carried from the orchard to the sheds, where they are prepared for market. Here they go through a process of fermentation or "sweating." For this purpose they are placed in a covered box, or they may even be covered with earth. This is called "claying." Now

the seeds must be dried. They are spread out on platforms, raised a little above the ground, so that the air can circulate underneath. You notice that the roofs do not cover them just now, for their only purpose is to keep off the

Fig. 41. — Drying Cocoa Seed. Ceylon.

(Permission of Walter Baker & Co. Ltd.)

dew and the rain. They are fastened to frames which have wheels under them. During the day they are not used, but at night they are rolled over the cocoa.

The cocoa is stirred by workmen using long

shovels or rakes, so that it may dry quickly and evenly. Once a day the beans are shoveled into heaps and the workmen tread upon them with their bare feet, as you see. This is called "dancing the cocoa."

After the seeds have dried for about two weeks they are nearly the color of red bricks. They are put up for shipment in canvas sacks holding one hundred and fifty pounds each. The name of the plantation is usually stamped upon the outside. Guayaquil exports more cocoa than any other city. Find it. A great deal comes from the island of Trinidad, and from the northern part of South America.

When the "beans" have reached their destination, they must be cleaned, to rid them of dust and dirt collected on the way. They are then placed in a great revolving cylinder and roasted. You remember that when coffee is roasted it brings out a pleasant odor called its *aroma*. The same is true of cocoa. The roasting also helps to loosen a shell which surrounds the seed. The shell is next removed and the "beans" are then crushed.

The Mexicans used to crush the seeds on a large stone, hollowed out on top. This they called a "matate."

The crushing is now done by machinery.

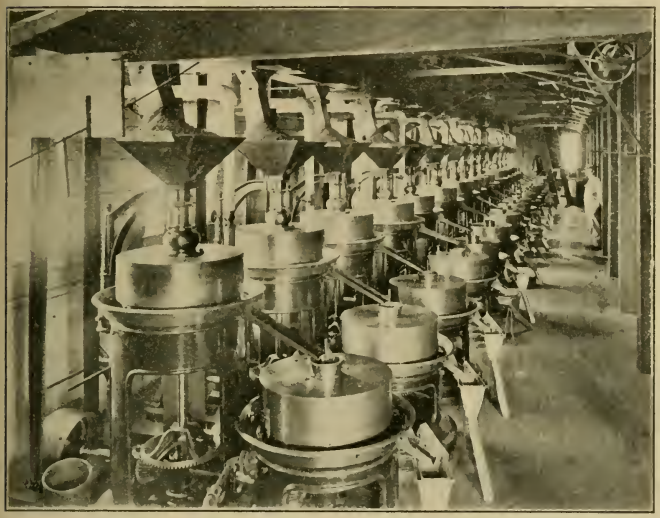


Fig. 42. — Grinding Cocoa.

(Permission of Walter Baker & Co., Ltd.)

The broken bits of the cocoa are called "cocoa nibs." When the cocoa is ground to a powder, it is put into strong bags and pressed. This pressure removes a part of an oily substance known as "cocoa butter." Remember, then, that

cocoa is the meal or flour made from the crushed seeds from which some of the oil has been removed. Chocolate differs from cocoa in that none of this oil is removed in making it.

Fig. 43. — Moulding Cocoa.

(Permission of Walter Baker & Co., Ltd.)

You have often seen the words "sweet chocolate" on the labels. This is made by adding a quantity of pulverized sugar to the "plain" or "bitter" chocolate. Sometimes vanilla beans are added.

The pasty mass known as chocolate must be molded. When the proper amount has been placed in each of several metal molds which rest on a table, they are made to rock or shake, and this causes the chocolate to assume the

Fig. 44. — Cooling Cocoa.

(Permission of Walter Baker & Co., Ltd.)

right shape. The molds are then taken to the cooling room, where they are placed on frames, one above another, in long rows. Girls and women wrap the cakes of chocolate in the wrappers specially prepared for them, after which they are packed in boxes ready for shipment.

At Dorchester, Massachusetts, on the Neponset River, is situated the largest establishment for the manufacture of cocoa and chocolate in America. It is interesting to know that on the very spot where these great mills now stand, was built, in 1765, the first one of the kind in this country.

A CRANBERRY BOG

Wareham, Massachusetts, Dec. 10, 1901.

Dear Frank: How surprised you will be to learn that I am now a country boy. We left Boston early last spring, and came out here to go into the business of cranberry raising. It seemed very strange at first to travel along country roads, or through woods and fields, instead of upon the cement walks of our city streets, but we all think the country delightful.

A cranberry farm is a marsh or a bog, so you will see that the vines need a great deal of water. There are both wild and cultivated bogs. Those that are cultivated are provided with a system of ditches, so that they can be flooded from time to time. It is a good deal like irrigation in Southern California, I suppose. We flood the bogs to prevent the berries from freezing, as well as to furnish the vines with water. I will tell you more about that by and by.

Father wanted a larger bog than the one he first bought, so, soon after we came, he got another small piece of marsh land which joins it on the west, and started vines on it.

You know that willows, rosebushes, grapevines, and many other plants will grow from *cuttings*. It is the same with cranberry vines. The lower end of each cutting is pressed into the soil, and it soon begins to grow. They are set in rows about fourteen inches apart. One of our neighbors, who was starting a bog at the same time, cut the vines into pieces an inch or two long, and scattered them over the ground. He then harrowed them in. The vines multiply just as strawberry plants do, by putting out *runners*.

They tell us that our new bog will produce a crop in three years. Do you have to wait that long for a crop of oranges?

By the middle of June our bog was in full blossom. The flowers are quite small and their color is a little like that of the flesh. I read an interesting thing about them the other day. It seems that the berries used to be called

"craneberries," because people thought that the blossoms, just before they opened fully, "resembled the neck, head, and bill of a crane." By dropping the *e*, we got the present name.

Fig. 45. — A Cranberry Bog. Showing the Young Vines.

During our harvest time, which lasted from the middle of September to the last of October, we were very busy. We did not commence to

go to school until the berries were picked. You see, frost may occur and spoil the crop, so that everybody works as fast as possible until the harvest is over. Father had about twenty

Fig. 46. — Cranberry Pickers at Work. Notice how the Bog is divided into Rows by Means of Cords.

pickers some of the time, besides our own family.

When we were ready to begin picking, father took some twine and stretched it back and forth across the bog, fastening it to small stakes. This divided the field into rows. Each

picker was given a row, and he was not allowed to change until it was finished.

At first it seemed great fun to get down on the ground and strip off the bright berries, but when one does this day after day it gets pretty tiresome. It must be easy to pick oranges, because you can stand up while you work.

Father paid the pickers twelve cents a pail. It takes about three pailfuls to make a bushel. I averaged about one dollar and a half each day. I bought a suit of clothes and all of my books for the year, and have considerable money left. Some of the pickers who were quite small did not earn very much. Do you recognize Jennie? She worked a part of every day.

Twice during the picking season there was a sharp frost, but we saved the crop.

The government sends out a Weather Map every day. Our teacher gets one, and there is one tacked up in the post office every morning. These maps tell what kind of weather to expect, and father watches them closely. When he saw that frost was likely to occur, he and the

men opened the gates which hold back the water, in order to flood the part of the bog where we had not picked. The vines were buried nearly two feet beneath the surface of the water. Father says the water cools so

Fig. 47. — A Young Worker. Notice how the Berries are picked.

slowly that its temperature is much above that of the surface of the ground or the air near it, so the berries do not get frost-bitten. Soon after sunrise the water was drawn off, and the next day the bog was dry enough for the pickers to work.

I wonder if the Weather Bureau is of any use to farmers in California. I know that the sailors watch for the flags which tell when storms are coming, that they may not go to sea if a violent storm is expected. Father says very many lives and much property are saved every year in this way.

Fig. 48. — Winnowing and Barreling Cranberries.

I have not told you what we do with the cranberries after they are picked. Of course we cannot help gathering some leaves and twigs with the berries, and these must be taken out. For this purpose the berries are put into a winnowing machine. I will send you a picture of one. As the man turns the crank, wooden fans within turn rapidly, blowing

out the leaves, twigs, and dirt. The berries drop through a screen and run out of a spout into a barrel, as you see. We then put them into crates or barrels for sale. Father tells me that cranberries are shipped from our country to Europe, because those raised here are much better than the European berries.

There are great quantities of cranberries raised in this part of Massachusetts. I have been reading lately that they are produced in New Jersey, on Long Island, in Michigan, Wisconsin, Minnesota, Canada, and some other sections. From what I have read, I guess they are not raised in Southern California. Wouldn't it seem strange if you were to eat berries raised on our bog, three thousand miles away?

Now I want you to tell me about the orange groves of Southern California, for none of us have ever seen an orange growing.

I wish you all a very "Merry Christmas" and a "Happy New Year."

Your loving friend,

WILL.

THE COCOANUT ISLANDS OF THE PACIFIC

Imagine yourself on a great ocean steamship, gliding over the blue water of the Pacific Ocean toward the Samoan Islands. Among the first things that you will see as you near the shores of these islands will be tall, slender, graceful trees, rising without a branch to a height of thirty to eighty feet. At the top is a sort of crown, composed of long, drooping leaves. These beautiful trees lean out over the water and toss their leaves in the strong and steady breeze from the ocean. They seem to nod a friendly greeting to you as you approach, and to wave a loving farewell to you as you sail away. These trees are the cocoanut palms. They grow on all of the tropical islands of the Pacific Ocean, in the West Indies, and along the shores of most warm countries, but never far from the sea.

When the cocoanut falls into the water, it is rocked and tossed by the waves and drifted about by the currents, but it is safe within its shell, for the salt water cannot penetrate this. When it finally comes to rest upon some strange shore, it is ready to give to the world another cocoanut palm, if the climate is like that from which it sailed. In this way nature has helped the trees to become widely distributed.

There are cocoanut plantations as well as wild groves of the trees. When a plantation is to be established, the planter selects the ripest nuts and dries them for several weeks. They are then planted, and by and by a little palm springs from the small end of the nut and the roots from the large end. When the young trees are from six months to two years old, they are transplanted in rows thirty or forty feet apart. They begin to bear nuts in about five years, but they do not yield a full crop for fifteen or twenty years. Do you think that a poor man could afford to go into the business of cocoanut raising?

As you see in the picture, cocoanuts grow

Fig. 49. — A Cocoanut Grove.

in clusters. You notice also that they grow close to the stem instead of at the ends of the branches. They do not all ripen at once, but nuts may be picked at almost any time. A tree will produce from fifty to one hundred nuts each year. If you were to go into an apple, a peach, or a cherry orchard, you could easily pick the ripe fruit. Gathering cocoanuts is quite a different matter, however. Let us observe this shiny-skinned Samoan boy and see how he picks them. He fastens a short piece of rope in the form of a loop to each foot. Letting one of the loops catch on a rough place on the bark of the tree he places the hollow of his foot against it, clasps the trunk with his hands, and raises himself a little. Then the other loop is fastened a little higher up, and he raises himself again. In this way he finally reaches the nuts. With a knife he cuts off the ripe ones, which fall to the ground and are then piled up. They are then placed in baskets which are hung from a pole and carried on the shoulders of two men or are loaded on to donkeys and taken to the shed.

The ripe cocoanut is a valuable article of food just as it is picked from the tree. It contains also a milk which is a nourishing drink. Most of the cocoanut sent to other countries, however, is in a form known as *copra*.

At the shed the hard shell, which covers the meat, is split open by means of an ax. The meat is removed with a knife and is then spread out on mats to dry. This dried cocoanut is copra.

The inhabitants of these cocoanut islands live in a much more simple style than we do, and the cocoanut tree supplies many of the things that they use daily.

Let us examine the home of a native Samoan. The frame and posts of the house are made of the slender trunks of the cocoanut palm, while the roof is covered with its leaves instead of with shingles. The cups, bowls, dippers, and many other household utensils are made of the shells. If a whole shell is wanted, the "eyes" are pushed in, the milk is used, and ants are allowed to eat the meat. These make excellent water bottles. Baskets, curtains, and twine, are made

from the fiber of the leaves, and the bark is used for fuel.

From the copra an oil is pressed which is used in the manufacture of soap. It makes a perfectly white soap that will float on the water. It is also used to furnish light, and the people rub it on their bodies to prevent sunburn. The sap of the tree is made into sugar, vinegar, and a liquor.

While in our country the cocoanut is important chiefly to bakers and confectioners, in these far-away islands it is the most useful of plants, and one of the chief articles of food. Would you not like to visit the cocoanut islands and learn more of their interesting people?

A BUNCH OF BANANAS

Every day, as you walk along the streets you see great bunches of bananas hanging in front of fruit and grocery stores. You find them at the corner fruit stand, and peddlers carry them from house to house.

Although bananas are so common now and so cheap that all can afford to eat them, this was not so when your grandparents were children. In those days the fruit was regarded as quite a luxury, for there were few people engaged in carrying it from its tropical home to the cities of our country. Now many small but swift ships, called "fruiters," carry on this business. They get their cargoes of fruit in the West Indies or Central America, and within a week after sailing they are unloading at New Orleans, Baltimore, New York, or Boston. If the number of bananas which reach our country each year were equally distributed, each person would receive twenty-five.

Let us get aboard that wonderful train upon which all may travel free of cost, which runs

Fig. 50. — A Banana Tree.

equally well upon land and water. We step off right in the center of a banana plantation on the island of Jamaica.

Yes, these are banana trees all about you. See how long and broad the leaves are and how gracefully they droop! Some of them are ten or fifteen feet long; almost as long as the trees are tall. The trees, you see, are simply stalks from which the leaves unroll. Here you can see some just starting out. They are rolls of bright green, pointing upward, each starting from the center of the stalk. No, the leaves were not torn in that way by the pickers. The wind sometimes whips them into ribbons, for they are very tender.

These stalks growing from the base of the main stem are called "suckers" here; in Costa Rica they are called "bits." You remember that there are no seeds in bananas. It is these "suckers" that are planted when a farmer wants to start a plantation. They are set out when two or three feet high and within a year they bear fruit. What did I tell you about the length of time required for the cocoanut to bear?

It is but four years since the trees in this plantation were single "suckers," standing

about fifteen feet apart. Now there are several stalks grouped about each parent plant, and the beautiful leaves, touching overhead, form shaded aisles of green.

Of course a great number of "suckers" are

Fig. 51.—A Banana Plantation.

not allowed to grow together. Keeping these cut down is called "cleaning the plantation."

Now let us examine the fruit on this tree beside us. You see that the great cluster or bunch is made up of smaller bunches. These are called "hands," and each banana is spoken

of as a "finger." Let us count the "hands" in this bunch. This is an unusually large one, for it contains thirteen. Nine "hands" make a *full bunch.* As you see, there are from ten to twenty "fingers" in a "hand." Buyers will seldom take bunches of less than six "hands."

Here come the fruit cutters to help get a cargo for the "fruiter" we saw at anchor.

Yes, the bananas are green, I know, and they are always green when gathered. They will ripen in the storehouses when they reach the United States.

No, it is not a waste to cut down the stalks, for they die after bearing their fruit, and the smaller stalks about them will soon yield. Some of these stalks, you see, have but one bunch and some have two or three. How odd the bunches look with the "fingers" all pointing upward!

The banana leaves which the men are wrapping about the bunches are to protect the fruit. It bruises very easily and great quantities are lost on this account. They are not always wrapped, however.

When the fruit reaches the vessel, it is carefully inspected; and if not in just the right condition, it is refused. The bunches which are accepted, are taken into the hold of the

Fig. 52. — Loading a Small Boat with Bananas to be taken to the "Fruiter" in the Harbor.

ship and packed closely together. The planter receives for these from ten to thirty-five cents a bunch. Just think of buying eight or nine dozen of bananas for ten cents!

The men will not stop work until the ship

is loaded. It may take twenty-four hours, and it may take twice that long, for a "fruiter" will carry from fifteen to twenty thousand bunches of fruit.

In some parts of Central America, where there are no harbors, the planters float the fruit down the streams in canoes. The vessels anchor at some distance from the shore, and the bananas are taken out in boats called *dories*. They are hoisted up to the deck of the ship by means of pulleys, and then packed in the hold. The thousands of bunches which are bruised in handling are thrown into the sea.

While the northern ports get most of their supply of bananas from the West Indies, the Pacific coast states are supplied from Central America. The "fruiters" unload at New Orleans into trains, which carry the fruit to Los Angeles, San Francisco, and other places. Banana trains also run from New Orleans to St. Louis, Chicago, and other parts of the country.

The fruit ships have great pipes or ventilators, which carry the cool, fresh air from the

sea down into the hold. Sometimes when they reach port it is so cold that the bananas cannot be taken out for a few days. Wagons are loaded with the fruit at the wharves, and it is taken to warehouses where it gradually turns

FIG. 53. — A "Fruiter" taking a Cargo of Bananas.

yellow. I am sure you have seen loads of the green fruit on the streets.

When the wholesale merchant sells the fruit, he often incloses each bunch in the rough material of which gunny sacks are made, and then puts a light, circular frame, made of strips of wood, over it. This, you see, protects the

bananas. The grocer or fruit man takes hold of the frame without danger of mashing the fruit, lifts the bunch, and hangs it upon a hook. The frame and sacking are then removed.

Bananas grow in the tropical parts of Asia and Africa and on many of the islands of the Pacific Ocean. They are also raised in Florida, and they ripen in sheltered places in Southern California.

You have seen both yellow and red bananas. The red ones usually bring the higher price, but they do not keep well and are not so extensively raised as the yellow ones.

The banana is an important article of food. It is much more nourishing than potatoes or even good, white bread. A flour or meal can be made from the fruit by drying it and then grinding.

HOW DATES GROW

Three thousand years before the shepherds followed the star to the manger at Bethlehem, the beautiful date palm was cultivated beside the banks of the Euphrates and the Nile rivers. The date was the bread of the people who lived in these fertile valleys, and it is an important article of food in northern Africa, Arabia, and Persia to-day.

Look at a map of northern Africa, and you will see that the great Sahara covers a large part of it. Here and there across the drifting sands wind caravan routes, traveled by camels ridden by strangely dressed men. These routes lead to beautiful garden spots called *oases*. Here are wells and springs, with little streams flowing in the shade of fig, date palm, and other trees. The people who dwell within these groves beside the cooling waters look out upon the desert as the inhabitants of an

island might look upon the boundless sea. Find some of these oases and learn why they are fertile. The people who live in these oases depend upon dates for their living. The dreary journey from the coast to the interior is made to procure quantities of this fruit, which are wanted by the outside world.

If you were to make a journey in a desert country, you would find that you could not carry such articles of food as you would have if you remained at home. The sunshine beats down fiercely, the springs and wells are far apart, and the patient animals must not be overloaded. The chief article of food carried is the date. A mass is packed together until it is so hard that pieces are chopped off with a hatchet when they are wanted.

Like the cocoanut palm, the date palm rises to a great height, sometimes fifty or sixty feet, without branches. It ends in a crown of beautiful feathery leaves which droop downward. These leaves may be ten or fifteen feet long. Many of them stand edgewise. Unlike most trees, the trunk does not steadily increase in

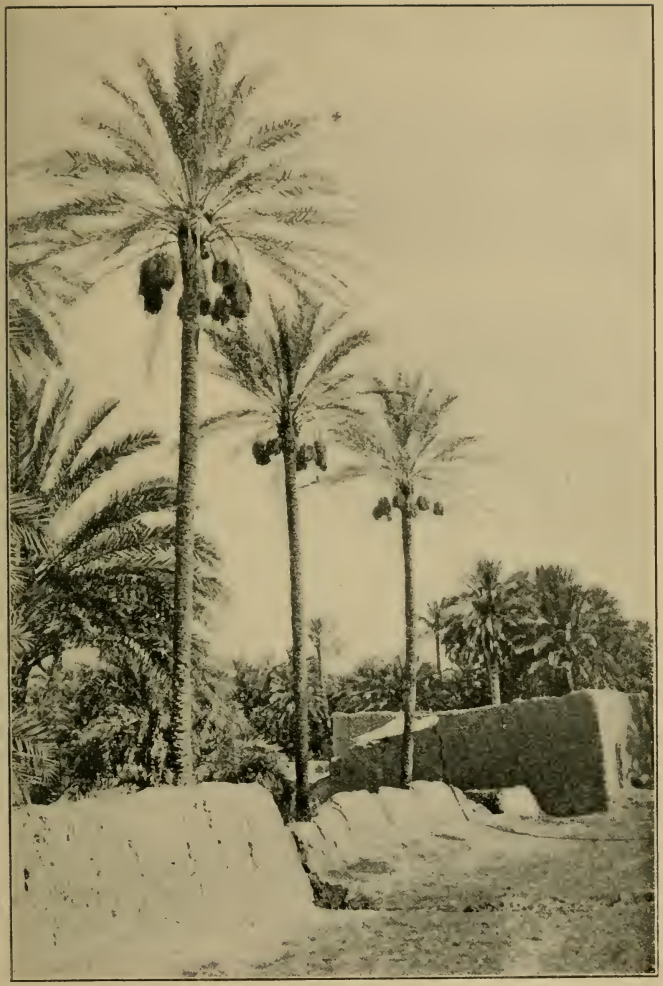


FIG. 54. — Date Palms loaded with Ripe Fruit, Biskra, Algeria.

(Year Book U. S. Department of Agriculture, 1900.)

size, and you can tell nothing as to the age of the tree by its diameter.

In its wild state many shoots spring from the base of the tree. These may grow as high as the parent stalk, so that in time a jungle or thicket is formed.

The flowers, which are clear white, grow in clusters. There are from six to twenty of these clusters on a tree, each of which produces a bunch of dates. The female tree bears the fruit. The blossoms are pollinated both by the wind and by man.

There are from ten to fifteen pounds of dates in a bunch. A tree will average from one hundred to two hundred pounds each year, although trees have been known to yield six hundred pounds. The trees yield when from four to eight years old, and continue to bear for a century.

The dates, green at first, later in the year a yellowish brown, are, when ripe, amber or black in color.

The trees require a very dry, hot climate, but moist soil. Long, long ago, this saying was

common among the Arabs, "The date palm, the queen of trees, must have her feet in running water and her head in the burning sky."

Although there are lovely date palm trees on the grounds of many California homes, few of them bear fruit. The temperature must average from eighty to ninety degrees for a considerable time in the summer, in order to mature it. What is the average summer temperature in your locality?

If an ordinary tree is frost-bitten, it recovers and soon puts out a new growth; but if the crown of the date palm be frozen, the tree dies.

When the Moors went to Spain, in the eleventh century, they introduced this valuable tree which the mission fathers several hundred years later brought to Mexico and to Southern California.

How would you like to try to climb a date palm tree? Although they look so smooth and are without branches, the natives of the desert climb them without any help whatever. The trunk is always somewhat rough, and this makes it possible to ascend them.

FIG. 55. — Date Palm Trees.

Not all of the dates in a bunch ripen at once, so they are usually picked by hand and only the ripe ones selected. Sometimes, however, the bunches are cut off. Some dates contain so much sap that the bunches must be hung up to allow it to drain off before they can be shipped. This sap is called *date honey*, and is saved. They are sent to the coast towns in bags or boxes called *frails*. Where dates are to be sold in small quantities, they are repacked in the small boxes such as you have seen.

You know that dates are very sweet, and it is no wonder that they are, for they contain from fifty-five to sixty per cent of sugar.

The trees are often tapped, and the sap which flows out is made into sugar. Vinegar and a liquor called *arrack* are also made from it. The leaves of the tree are made into bags and mats; from the stones a drink is made which takes the place of coffee. From the leafstalks baskets are made, while the trunk furnishes material for houses and for fences.

If the dates could speak, they could tell us

many wonderful stories of the far East, of the river boats on the Nile, of the drifting sands which come so close to the river's banks, of the caravans creeping over the desert toward the green oases and then fading out of sight, bearing loads of this food to the countries where it is not produced.

THE ORANGE GROVES OF SOUTHERN CALIFORNIA

Pasadena, California, Jan. 4, 1902.

Dear Friend Will: I was very glad to receive your letter, and much surprised to know that you are living on a farm. I am glad that you described the raising of cranberries, for I did not know much about it before. When I told my teacher about getting the letter, she asked me to read it in the geography class and to show the pictures. I asked our groceryman where he gets his cranberries, and found that some of them came from Wareham.

You are having cold weather now, I know. Is the skating good? I have not seen ice as thick as window glass since we came to California, except that delivered by the iceman. Just now there is a beautiful covering of snow on the mountains a few miles north and east of town. Just think of picking roses and callas

with snow in plain sight! The snow never remains more than a day or two on these mountains.

Soon after we came to Pasadena, father bought an orange grove of twenty-five acres. We are picking the fruit now. People began to pick oranges several weeks ago, and the work will continue all winter.

Orange trees are planted about twenty feet apart, but the groves do not look as apple orchards do in the East, for no grass is allowed to grow in them.

The best orange section is east of here, near Redlands and Riverside, but some good fruit is raised near Pasadena also.

Father keeps our trees pruned down rather low, so that it is easier to pick the oranges than it would be if they were allowed to grow very tall.

Orange raising is like cranberry growing in one way — the land must be irrigated in each case. Here the water is piped from the mountain streams and from tunnels. We form basins about ten feet square around each tree

and fill them with water. Most of our irrigating is done during the summer, as the winter is our rainy season. *You* would not call it a very rainy time. Our average is about twenty inches for the whole year.

The trees in our grove have been set out about six years, and they are bearing nicely now. Orange trees begin to bear when they are four years old; so, you see, we have to wait a little longer for a crop than you do for a crop of cranberries. It costs a good deal to start an orange grove. Trees cost from one dollar to one and one-half dollars each at the nurseries. A few years ago they sold for twenty cents each.

I wish that you could see the trees when they are in full blossom, and also when they are loaded with the golden fruit. I am going to put some orange blossoms into the envelope, but I am afraid they will not reach you in very good condition. They are very fragrant, and you can smell their perfume some distance from a tree in blossom.

To-day we picked about two hundred and fifty boxes of oranges. We always speak of *picking*

them, although they are not picked, but cut. You see, if they were picked off, the part where the stem pulled off would soon begin to decay.

We take a wagon load of fruit boxes, and, while father drives slowly between the rows of trees, I throw them off.

Fig. 56. — Picking Oranges in California.

Each picker carries a sack slung over one shoulder, and as fast as he cuts off an orange, he drops it into the sack. The sacks are emptied into the boxes, and these are loaded on to the wagon. Father pays five cents a box for picking, and a good picker will gather about forty boxes in a day.

We sell most of our oranges to fruit companies. These companies pack and ship the fruit. At the packing houses the oranges are placed in tubs of water and scrubbed with small brushes. Many women, girls, and boys

Fig. 57. — Grading and Packing Oranges.

work at this. The washing is to take off dirt, and also *scale*.

After the oranges are washed, they are placed in a sort of trough which is highest at the end near the tub. They roll down this trough to the *grader*. This is a machine so arranged that the oranges pass through different openings according to their size, and come out sorted.

In the warehouse close by they are wrapped and packed. Chinamen often do this work. Each orange is wrapped in a separate piece of paper, which has the brand of the company stamped upon it. It is then packed firmly in a box. A certain number of oranges of each grade fill a box, ninety-six of the largest grade, and about two hundred of the smallest. Those which are too small, as well as the imperfect oranges, are rejected. These are called *culls*. Sometimes these are sold for a low price, and sometimes they are thrown away by wagon loads.

After the boxes are filled, they are placed in special fruit cars and hurried to St. Louis, Chicago, New York, Boston, and other cities.

Yes, the Weather Bureau is of great help to fruit growers. Of course we have very little winter here, but oranges will not endure much cold. The mercury falls below the freezing point but a few times each season. On New Year's Day the temperature here was fifty-eight degrees. I looked up the Boston temperature for the same day and found that it was only

four degrees above zero. When the Bureau predicts a sharp freeze, the farmers build small fires in their orchards, or turn on a good deal of water. The fires are built in small wire baskets. They make a smudge instead of a flame. The people in the raisin districts watch the weather reports pretty closely, for rain injures the drying grapes.

Growers have to *spray* or *fumigate* the trees to destroy the scale that I spoke of which is a great enemy of the orange, to kill the insects, and to wash off dirt. This is sometimes done by putting a great piece of canvas over the tree, forming a sort of tent which prevents the fumes from escaping. It was found that the ladybugs would eat the scale and so they were brought into California from the East. They do a great deal of good, but still we have to spray the trees.

Orange trees are raised from the seed, and the trees produced in this way are called *seedlings*. By *budding*, a fruit much better than the oranges grown on the seedling tree has been produced. There were five acres of seedlings

in our grove, and father budded the trees. He cut off the limbs rather close to the trunk of the tree. Then he slipped buds from *navel* trees into cuts made through the bark in the end of each limb left on the tree. He then wound cord tightly about the limb and put on some wax. After a time a new growth started out where these buds were placed. These new branches will bear much improved fruit.

We have a very fine variety of oranges called Washington Navels. Trees of this variety were obtained by our government from Brazil. Two of these were brought to Riverside, a town about seventy-five miles east of Pasadena, and planted on a ranch belonging to a Mr. Tibbitts. They did well, and all of the trees of this variety in Southern California were obtained from these two through budding. These trees are still living, and I will send you a picture of one of them. It stands at the head of a fine drive called Magnolia Avenue.

California and Florida are the two important orange-growing states of our country. Father says the industry is much older in Florida than

in our state. Florida growers can ship their fruit to market much cheaper than we can. It costs us ninety cents for each box.

Mexico, the West Indies, Italy, southern France, and Spain are also orange producers. These countries have the advantage of cheap labor, father says.

I wish that you could visit us. We would have fine times, I am sure.

The next time I write I will tell you about some of the other fruits raised in California.

Your sincere friend,

FRANK.

A VISIT TO A VINEYARD

PASADENA, CALIFORNIA, OCT. 1, 1902.

DEAR FRIEND WILL: Last week father went to Fresno, which is about three hundred miles northwest of here, in the San Joaquin valley. He took me with him, and we visited some of the great vineyards and raisin-packing establishments near and in that city.

Raisins are simply dried grapes. Although there are many countries where grapes grow, there are few where raisins are made. Dew, fog, and rain injure the fruit, so that the San Joaquin valley, with its dry, hot atmosphere, is well adapted to this industry.

There are a great many different kinds of grapes but only the green variety is used in making raisins. The raisin grapes are called *muscats*. If the grapes are left on the vines long enough, they become raisins. I have picked some pretty good raisins from the vines.

Of course by being spread out, they dry quicker and more evenly.

The sugar that you find on and in the raisins is not put there by the people who dry the grapes. It comes from the juice of the grape.

Grapevines grow from both roots and cuttings. Of course cuttings are the cheaper. Often they may be had for the asking. Many think that it is better to set out rooted vines than cuttings.

They are planted in rows from six feet apart to twelve or fifteen feet. During the first year the young vines will grow several feet. In the fall, when the flow of the sap has been checked by frost, the vines are pruned. A vineyard in California looks quite different from one in the East. During the winter it is simply so many rows of stumps several inches in thickness and one or two feet high. During the summer the branches grow from these stumps and produce their beautiful clusters of grapes, only to be cut off in the fall or winter.

The trimmings are generally burned in the vineyard at the same time that they are cut off.

A sort of furnace made of sheet iron is fastened between two wheels and drawn by horses up and down between the rows. A man pitches the cuttings into it, and they burn as it moves along.

In the early summer men go through the vineyards sprinkling a coating of sulphur on the vines. This it to prevent mildew, which damages the fruit very much.

During the last half of August and September the grapes are picked. Sometimes the harvest continues into October. Most of the grapes had been gathered when we visited the vineyards.

When the juice of the grapes is one fourth sugar, they are ready to pick. The grower generally tells the condition by the taste and color of the fruit, although there are instruments for determining the amount of sugar.

Like oranges, grapes are cut from the vines and not picked. We saw great companies of Chinamen going through the vineyards cutting off the beautiful clusters. These they placed on shallow, wooden trays to dry. In a week or

Fig. 58. — Picking Grapes. — Notice the Mountains in the Background.

two, when the upper side of the clusters is pretty well dried, the grapes are turned. We saw the workmen place an empty tray, upside down, over the filled one. Then, holding the two together, they turned them over, and the

Fig. 59. — Drying Raisin Grapes.

grapes dropped into the tray that had been placed on top.

During this drying time the people watch the reports of the Weather Bureau. In some places flags are displayed when rain is expected.

As a rule the grape season is over before the rains begin.

When the grapes are taken from the trays, they are placed in boxes holding about one hundred pounds each. These are called *sweat*

Fig. 60. — A Vineyard after being Pruned.

boxes. Here the driest grapes absorb some of the moisture from the others, and the mass becomes more uniform.

After the drying process has been finished, the stems are rather brittle. To make them

softer and easier to handle, the grapes are next placed in a cool room and left there for a time.

After visiting some of the vineyards, we drove to one of the great packing establishments in Fresno. These packing houses are nearly always in the cities and towns, because there help can be easily obtained. The packing house that we visited employs four hundred people, mostly girls and women.

The raisins are first placed on wooden or metal frames the size of a raisin box. These are called *forms*, and the packers are paid according to the number of forms filled. When these are filled, the raisins are carefully transferred to the boxes.

A box of raisins weighs twenty pounds, but there are half boxes and quarter boxes put up also. A paper is placed on the bottom of each box, and over the raisins another is placed. On top of this there is a fancy paper on which the name of the packer is stamped.

In most establishments there are three grades of raisins, Imperial Clusters, London Layers, and the loose and imperfect stems.

Sometimes a second crop of grapes is gathered a little later in the fall. Of course these do not dry so well because the days are shorter, it is cooler, and rains sometimes occur. On this account they are dipped in lye and then rinsed in water. The lye cracks the skin, and so the juice evaporates more quickly. These are called Valencia raisins. There is not a very good market for these, so that people do not dip them so commonly now as they used to.

We saw the machine where the raisins are *stemmed*. They pass from a hopper into a space between two woven-wire cylinders. The inner one revolves within the other. In this way the raisins are broken from the stems. They are then run through a fanning mill which cleans them, and they are finally graded by passing through screens having openings of different sizes.

Most of the seedless raisins are made from seedless grapes, but there are machines for removing the seeds from the grapes which contain them.

The superintendent of the packing house said

that nearly all of the raisins that we import come from Spain, and that they are exported chiefly from the city of Malaga.

The purple and other *wine grapes* are taken to the wineries and sold by the ton, to be made into wine.

There are many other things that I should like to write about, but my letter is a pretty long one now, so I will close.

Your loving friend,

FRANK.

NUTTING

Have you ever gone into the woods on a beautiful autumn day? The bright, warm sunshine floods the earth where the trees are far apart and sifts down through the branches. All nature seems to invite you to lie down under a tree and dream. It was on such a day that Rip Van Winkle fell into his long sleep.

How pretty the trees look in their fall suits of yellow, crimson, red, and brown! What a rustling is made as your feet tread the carpet of leaves!

The breezes pass among the branches and whisper a message to the bright-colored leaves. They understand and obey. Singly, in groups, and in showers, they silently float downward. By night and by day they fall, but soon this carpet will be changed for one of white.

Listen! The leaves are not the only things that are falling. You can hear the *thump*,

thump of nuts as they drop from their lofty perches in the walnut and hickory-nut trees.

Sit down quietly on that log and you will soon see the busy nut gatherers. With their tails curled over their backs, they race up and down the trees, or spring from branch to branch, carrying their precious burdens to their homes in the hollows of trunk or limb. Now one sits up straight, holding a nut between his paws, and turning it slowly as he cracks and eats it. If he sees you, he whisks out of sight, or scolds you from a safe place far above the ground.

When the winter winds are whistling through the leafless trees, and snows are drifting over the ground, these little nut gatherers feast to their hearts' content.

The squirrels do not gather all of the nuts. Children and grown people enjoy nutting. When there are not enough nuts on the ground, the men and boys climb the trees to shake them off. Then everybody hunts among the leaves for the treasures.

Some of the most important nuts are walnuts,

hickory nuts, hazelnuts, almonds, chestnuts, Brazil nuts, pecans, and peanuts.

Many of the hickory nuts fall out of their coverings bright and clean. Walnuts generally have to be *shucked*, and the juice stains the hands almost black.

As hazelnuts grow on bushes, they can be easily picked. They usually drop out of their burs after there have been a few frosts.

Many nuts are gathered in the woods, but in some places the trees are cultivated just as fruit trees are.

We usually eat nuts between meals, or as a dessert. They are not simply dainties, but are very valuable articles of food. In some countries the poor people depend upon them for food.

In almost any city of our country are to be found the nuts that I have mentioned, with perhaps several other kinds. These have come from different states, some from Canada, some from Brazil, and some from Spain.

I am sure you will enjoy gathering nuts of different kinds, so let us set out on a nutting expedition.

A WALNUT VACATION

How would you like to have your school close for two weeks, so that you could gather walnuts? Every year many of the boys and girls of Southern California are given a vacation just for this purpose. It is called the "walnut vacation," and occurs in the month of October.

These children do not take their baskets and go off to the woods where they can romp and play, watch the squirrels, and gather beautiful autumn leaves. They gather nuts from the trees which their parents own, for in Southern California there are many walnut ranches or groves. You see the vacation means a vacation for work instead of for play.

Walnut trees are set out in rows just as apple trees are, but their roots and branches extend to such a distance from the trunks that they need to be about twice as far apart.

The walnut harvest, which begins about the

first of October, is a busy time. Men, women, boys, and girls may be seen in the groves, shaking the nuts from the trees, picking them up, and putting them into sacks.

Fig. 61. — A Walnut Grove.

The men shake the trees, and there is a shower of nuts to the earth. Do not go under the branches now unless you want to be pelted. A single tree has been known to yield three hundred pounds of nuts in a season.

When the trees have been given a good shaking, there are still some nuts clinging to the branches. These are obtained by shaking the limbs separately, by means of long poles, to the ends of which wire hooks are fastened. As all of the nuts do not ripen at the same time, the trees are sometimes gone over two or three times.

Now the boys, girls, and women go to work filling pails and baskets and emptying them into sacks, for they can do this work as well as men.

Usually the nuts drop out of their covering or *shuck* when they strike the ground; but if they do not, the *shuck* must be removed. Sometimes the covering is cut off. If you handle the nuts with your bare hands, they will be stained almost black, and you will have to let the color wear off.

The days are bright and warm, and this sort of nutting becomes rather tiresome before sundown. The work must be done and the vacation is not a very long one, so each does his part cheerfully.

When the nuts have been gathered, they are taken to the shed or place where they are to be washed. Here they are poured into a large wire cylinder which revolves in a tank filled with water. The machine is turned by a horse walking round and round, and it both washes

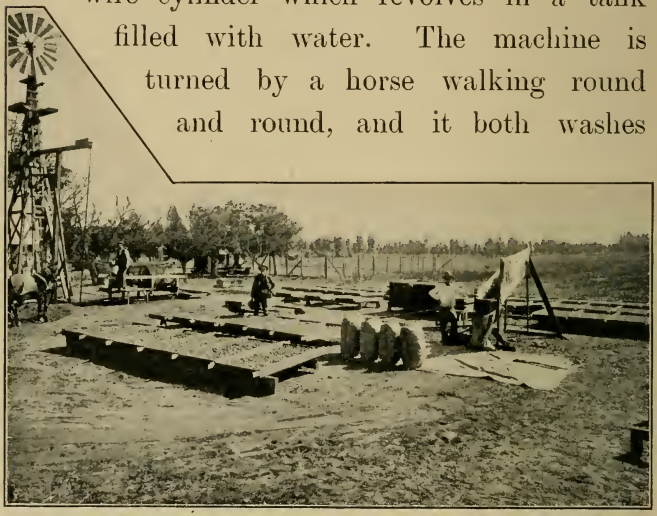


Fig. 62. — Washing, Drying, and Sacking Walnuts.

and grades the nuts. The smaller ones pass through the meshes in the wire and are called *second grade.* The larger ones are known as *first grade.*

When the walnuts come out of the washer, they are spread out on shallow, wooden trays to dry. Sometimes several thousand trays may be

seen on one ranch. They are loaded on to a small car and pushed to the part of the field where they are wanted.

If there is no foggy or cloudy weather, they will dry in about five days, but if there is, it may take ten.

After the nuts are thoroughly dried, the trays are placed on the car and pushed to the *bleacher*. This is a large box made of tarred paper. It is placed over the trays, and a quantity of sulphur is burned in it. This is simply to whiten the shells, for they sell for a higher price when they are bleached. Sometimes the nuts are whitened by dipping them into a liquid preparation.

The nuts are now sacked and marked, ready to ship. Soon after the boys and girls have finished their "walnut vacation," the nuts are on their way to the eastern part of the United States.

Most of the walnuts raised in California have soft shells. Some have such thin shells that they are called "paper shells." The walnuts that grow in the woods of Indiana, Illinois,

and other states have hard shells. They are dark in color and are called *black walnuts*. The trees are quite valuable, as the wood is used in making furniture.

CHESTNUTS

Let us go on a chestnutting expedition to the southern part of France. We can gather the nuts in many of the states of our own country, but the trip to a strange land will be enjoyed by all.

The chestnut trees, many of which are very old, spread their branches to great distances. The nuts, as you see, are inclosed in a *bur* or coat which covers the shell. There are generally two nuts in each bur.

When *you* eat chestnuts, you eat them as a sort of dainty, not as a regular article of food. This is not the case in the home of Jean, the boy who is helping his father fill those sacks. In his home, as in many homes in southern Europe, the nuts form one of the chief articles of daily food.

In the winter Jean sells the freshly roasted nuts on a street corner in the city of Lyons.

He gets a good many pennies each noon from workmen and poor people generally, who use them for their midday meal. He sells ten nuts for a penny.

This is not the only way in which they are eaten. Jean's mother boils them with celery and mashes them as we do potatoes. The nuts are also ground into a flour from which bread is made. They are often used in the dressing for fowls.

Confectioners use great quantities of chestnuts. In Lyons there are establishments where as many as two hundred persons are employed in preparing them.

The nuts are first peeled, and then boiled in clear water, which removes the thin coating next the kernel. They are then placed in a sirup flavored with Mexican vanilla, in which they remain for about three days. After draining, they are coated with vanilla or chocolate and packed in attractive boxes. In this form they are worth forty-five or fifty cents a pound.

A BAG OF PEANUTS

Last summer Harry's parents took him with them on a visit to Virginia. Harry has always lived in New York City, and the country life of the South was very interesting to him.

They visited friends who live on a beautiful *plantation*, as the farms in the South are called. A driveway lined with grand old trees leads through the flower-studded lawn up to the retired manor house, whose wide verandas completely circle it round.

Beyond the house are the stables where work horses, driving horses, and saddle horses are kept; and beyond these is the pretty little boathouse, standing on the bank of a small river that winds its way through the plantation.

The morning after Harry arrived, his friend Bert asked him if he would like to go across the river to see the men harvest peanuts.

Now whenever Harry had wanted peanuts,

he had always gone to a stand and bought a sack. He had never thought about where they came from. He had heard of shaking nuts from trees, so he supposed that they were going to the woods.

He was therefore much surprised when Bert took him to a field across the river where men were plowing vines from the ground.

"Do peanuts grow in the ground?" he asked.

"Why, of course they do," answered Bert.

"I thought that nuts grew on trees," said Harry.

"Father says that the peanut is not a *real* nut," replied his friend. "He says they should be called *ground nuts* or *ground peas*." He pulled up one of the vines, and the boys threw themselves down under a tree to examine it.

When the small clods of soil clinging to the roots of the plant had been removed, Harry saw a number of pods which he recognized as peanuts.

Opening one of the pods, Bert took out the kernels.

"These," said he, "are the *seeds*, and they are planted much as other seeds are.

"Before they are planted the shell must be removed, but we have to be careful not to break the thin skin that covers the kernel. If that be broken, the seed will not grow.

"The kernels are planted about one foot apart, in rows that are, as you see, about three feet apart. Sometimes they are planted by hand and sometimes by machinery."

"I wonder if peanuts are raised in the country around New York," said Harry.

"No, I think not," replied Bert, "for they are very easily killed by frost. Great quantities are raised in North Carolina and in Tennessee. Father says that the negroes of western Africa raised them long, long before they were known in the United States. He says that they are a very important article of food there, and that whole villages take part in the planting and harvesting.

"After the vines blossom," continued Bert, "a very strange thing happens."

"What is it?" asked Harry.

"The flower stalks bend downward and push themselves right into the soil, and on these the pods develop. If the stalks do not enter the earth within a few hours after the flowers fall, they die."

Harry now watched the plowing. The plows were drawn up and down the rows and ran directly under the vines, lifting them out of the soil. After they had been plowed out about two hours, men took them upon pitchforks and piled them up. Harry noticed that some of the piles were covered with corn fodder, and asked why this was. Bert told him that it was to keep out the rain.

"What happens to the nuts after the vines have been piled up?" said Harry.

"They remain in the piles fifteen or twenty days, and are then spread out on the ground or hauled to the barn, where the nuts are picked off," answered Bert. "Sometimes they are picked by hand and sometimes by machinery. Let us go to the lower field; we have an earlier variety there, and the nuts are being picked now."

They found men, women, and children picking the pods one by one and dropping them into baskets. These were emptied into sacks. Harry tried to lift one of these, and was surprised to find it so heavy. Bert told him that it weighed about one hundred pounds.

"Do you burn the vines after the nuts are picked?" asked Harry.

"No," said Bert, "they are fed to the cattle. We call the vines *peanut hay*."

Bert explained that his father sold the sacks of nuts to the factory, where they were cleaned and sorted.

The next day the boys went to town and visited the peanut factory.

The nuts were first put through a machine which removed the dirt. They were then polished and sorted into four grades. The poorest grade is used in making peanut candy. The nuts were then sacked, and were ready to be shipped to the North.

Harry learned that an oil is made from the nuts which is used as olive oil is used, and also that peanut butter is produced from them. He

found that many men were employed on plantations all through Virginia and other states of the South, in raising the peanuts that are sold on the streets of every city and town in our country.

ASSORTED NUTS

After the Thanksgiving dinner had been eaten, the nuts were passed, and the children asked Uncle John to tell them something about a few of them.

"All right," said he. "You pick out the ones that you want to know about."

Frank handed him an almond.

"This nut," said Uncle John, "came from sunny Spain. It grew not far from the blue Mediterranean. Almonds are raised in most parts of southern Europe and in the northern part of Africa. Ages ago they grew in the Holy Land, and are mentioned in the Bible."

"Do almonds grow in any part of our country?" asked Helen.

"I think they grow in California," said Frank.

"You are right," said Uncle John. "There are many almond orchards in the southern part of the state.

"An almond tree in full bloom is a beautiful sight. The blossoms are white, tinted with pink, and as they appear before the leaves do, there is nothing to hide them."

Fig. 63. — Almond Trees in Full Bloom.

"Does the nut have a covering?" inquired Mary.

"Yes," replied Uncle John. "When the nut is ripe, the shuck opens gradually, and sometimes the nuts fall out.

"When people have large orchards, they

spread pieces of canvas under the trees and then shake them or beat them by means of long poles.

"The nuts that do not fall out of the shucks are obtained by opening the shuck with a knife. The nuts are then dried, and are ready for market."

As soon as Uncle John had finished, Mary handed him a hazelnut. "Please tell about this one," said she.

"I have often gone hazel nutting when I was a boy," said her uncle. "Hazelnuts grow on bushes in thickets. They are six or eight feet high and very slender. Baskets are sometimes made of them, and I have often used them for arrows.

"Sometimes the nuts grow singly, and sometimes in groups of two or three. A bur covers the nut, which sticks very closely until it is ripe. Then the nuts often fall out.

"After I had gathered the hazelnuts, I used to spread them out on the roof of the wood house to dry."

"Nuts that look just like these are called filberts," said Helen.

"Filberts are cultivated hazelnuts," replied Uncle John; "they are larger than the wild ones."

"I would like to know how this nut grows," said Helen, handing her uncle a black nut shaped like a triangular prism.

"This," said Uncle John, "came from Brazil, and is called a Brazil nut. Do you know where Brazil is?"

"It is in the northeastern part of South America," replied Helen.

"The great Amazon River is in Brazil, and it flows through tropical forests," said Mary.

"Much of our coffee comes from Brazil," said Frank.

Uncle John then told the children that Brazil nuts come from the northern part of Brazil and from the Orinoco valley.

Helen asked if they grow as walnuts and hickory nuts do.

"No," answered her uncle, "they grow inside of a great case or shell. There are from eighteen to twenty-five in one shell, which is nearly as large as a man's head."

"How are the nuts got out of the shells?" asked Mary.

"When they fall, men break them open and take out the nuts," replied Uncle John. "Most of them are sent down the Amazon to the city of Para and from there shipped to the United States and other countries."

None of the children knew where Para is situated, so they all went to the library to look at the atlas. After they had located it, Uncle John told them of his visit to the city and of the wonderful things which he saw on a steamboat trip up the Amazon River.

A STRANGE CONVERSATION

One evening after I had been reading for some time, I went to the kitchen to get a drink of water. That part of the house was dark and quiet, and as I stepped through the doorway, I heard low, musical voices, apparently in the pantry. I was very much surprised, you may be sure, and I kept perfectly still, and listened.

"Yes," said a voice, which I could barely hear, "I am a long way from home indeed, and sometimes it makes me quite lonely when I think of it."

"Tell us about your home, and how you lived," said another low voice.

"Well," began the first speaker, "my name is *Pepper*. With twenty-five or thirty brothers and sisters I grew in a cluster on a vine. We were but a small part of the family, for there were similar clusters all over our vine.

We were about as large as peas, and grew somewhat after the fashion of currants.

"All about were other vines to which friends and relatives were attached. Pepper vines are always anxious to get to the top, and so some of these vines climbed trees and some twined themselves about poles, which men had set in the ground for this purpose. Our vine was three or four years old when we appeared on it."

"How long did you live on the vine?" asked a voice that I had not heard before.

"Only a few months," replied Pepper. "You see, we had to make room for another set of berries. Two sets appear each year for twenty years or more.

"Under the influence of the tropical sunshine and the warm rains we grew day by day, and we were as happy as the butterflies and birds about us. By and by we began to turn red. All of this time a *hull* or coat was forming on the outside of our bodies.

"Before we became entirely red, workmen came to the field, and, by rubbing us between

their hands, separated us from the stems to which we lovingly clung.

"After having been picked, I was, with many others, placed upon a mat to dry. These mats were all about us, each covered with berries. After being thoroughly dried we were put into a mill and ground, and I became what I am now, *Black Pepper*."

"Are there other kinds of pepper?" asked some one.

"Oh, yes," said Pepper, "there is *White Pepper*, and *Red*, or *Cayenne Pepper*. Some of my friends were made into White Pepper. They were soaked in limewater for about two weeks, and this, of course, softened and wrinkled their hulls which had always fitted so nicely. This was bad enough, but it was not the worst."

"What happened next?" said several voices.

"They were then," continued Pepper, "trodden under the bare feet of dark-skinned men, and this rubbed off their hulls completely. After this they were ground as we had been.

"Cayenne Pepper is not a member of our

family at all, although it has the same name. I have looked up its genealogy, and I find that it received its name from the city of Cayenne, in French Guiana, near which it grows. It is in the form of bell-shaped pods, and grows on low, bushy plants instead of vines.

"The pods are green at first, but red when ripe. No doubt you have seen strings of them hanging in the grocery store when you were on the shelves. People sometimes use the pods as they are, but usually they are dried, ground, mixed with yeast, and baked into flat cakes like crackers. When these cakes are ground, Red, or Cayenne Pepper, is produced. It is put up in little boxes just as we are.

"Pepper used to be regarded as a great luxury," the speaker went on. "Until the eighteenth century the Portuguese handled almost all of it. It was not uncommon for rents to be paid with pepper. If any of you have read ancient history, you know that when Alaric took Rome he demanded, among other things, one thousand pounds of pepper as a ransom.

"My home was in the East Indies," said

Pepper, "but there are members of our family living in the Philippines, India, Mexico, the West Indies, and other tropical countries."

"Your story is a very interesting one," said a voice, "and now, if you care to hear it, I will tell something of my life."

"Yes, do tell us," said several at once.

"Very well, I will follow the example of our friend Pepper and introduce myself at once. I am known as Ginger. I have relatives living in China, in India, and in the western part of Africa, but I came from the West Indies. The Ginger family is not like that of Pepper; it has no lofty notions."

Pepper seemed a little inclined to get angry, so Ginger hastened to say: "I mean that our vines do not climb trees or poles, but run along the ground. I was a *root* and not a *fruit*."

"When I was about a year old I, with countless friends, was dug from the ground. We were cut from the vines and put into vats of scalding water."

"That was *dreadful*," said Pepper.

"We were treated in that way to prevent us

from *sprouting*," continued Ginger. "After being taken out of the water, we were thoroughly dried and then ground. We were then put up in cans and boxes and sold as *Black Ginger*. Others were scraped before being ground, and they were then called *White Ginger*.

"We were placed on board a great ship and finally landed at New York. After remaining in a large store there for some time, I was brought to the corner grocery, and so I found my way to this shelf.

"I am gradually wasting away, and I shall not last a great while longer. In my tropical home I seemed to be of no use to anybody, while now I am called for frequently by the cook, and my services seem to be appreciated, so I am happy."

"To be of some real use in this world is the greatest joy of life," remarked a strange voice.

There was silence for a moment, and then Ginger said "May we not hear from you, friend?"

"Your stories almost make me believe that I am still in the land of my birth," was the reply.

There was a peculiar little rattle about the voice, which I recognized at once as belonging to Cinnamon.

"For several years I was rocked to and fro by gentle tropic breezes or lashed about by storms. From my perch I could see beautiful flowers, bright insects, and even serpents in the thicket at my feet. Birds of brilliant plumage often perched upon me. My home was on the island of Ceylon.

"It is often said that where there is much bark there is no bite. In my own case that is not so."

"I do not understand," said Ginger.

"Why," said Cinnamon, laughing, "I am *all* bark, and I have considerable bite, as those who have tasted me know.

"I was taken from one of the smaller limbs of a cinnamon tree. I was slipped within a larger piece of bark, for we each rolled up when stripped from the limbs. A still larger piece was slipped over us and so on until quite a bundle had been formed. Some were quite short, and some were three feet in length.

"We were then gathered into packages and a sort of matting was sewed about us. In this form we were shipped to New York. In a great warehouse there I became acquainted with Cinnamon from Java, China, Egypt, and Brazil. From these friends I learned many interesting things about different parts of the world, which I may tell you some time."

Another voice now took up the conversation.

"We have heard from a fruit, a root, and a bark. I am none of these, but a flower not fully developed. I was one of the myriad buds that decorated a beautiful evergreen tree, on an island in the Indian Ocean.

"Men call me *Clove* because I bear some resemblance to a little nail. The part of my body which looks like the head of a nail is formed by the corolla which did not have a chance to open fully.

"When I was picked, I was just changing from a green to a red color. I was placed, with others of my kind, on a large cloth spread on the ground, and there we dried and hardened. As we dried, we became dark brown in color.

"Our family used to live on the Molucca Islands, but it has been scattered, and members are now found in tropical Africa, in Brazil, in the West Indies, and elsewhere."

There was a slight stir as though some one else were preparing to speak, but just at that minute a door slammed, and in an instant all was still. I waited for some time, hoping to hear more of this interesting conversation; but not another word was spoken, so I hurried to the library and wrote all that I had heard.

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